Alive Dead Media
Pixel graphics
Tero Heikkinen 22.5.2019

- 1980s 8-bit and 16-bit home computer graphics
- Pixel Art today
- Case Sinclair ZX Spectrum:
  - Limitations
  - Full screen images
  - Game graphics (tile graphics)
- *Multipaint* and Wednesday/Thursday tasks

Amstrad CPC 6128
Commodore 64
ZX Spectrum
MSX
(Toshiba HX-10)
AMSTRAD 128k Colour Personal Computer
CPC6128
commodore 64
TOSHIBA HOME COMPUTER HX-10 64K
MSX

8-bit home computer graphics
Late 1970s to late 1980s

- Popular models: Commodore 64, Sinclair ZX Spectrum, Amstrad CPC, MSX, Nintendo Entertainment System, Sega Master System
- Tiny memory (64 Kilobytes = 65536 bytes)
- Low resolution (160 x 200, 256 x 192, 320 x 200)
- Limited, fixed palettes (8-16 colours)
- Colour resolution usually less than pixel resolution
- Hardware “sprites” important for games

Bug-Byte: *Manic Miner*, ZX Spectrum, 1983, 256 x 192 bitmap

Ocean: *Rambo*, Commodore 64, 1985, 160 x 200 character mode

4 x 8 character display and overlaid 24 x 21 pixel “sprites”

Rainbow Arts: *Great Giana Sisters*, Commodore 64, 1987

System 3: *Last Ninja*, Commodore 64, 1987, 160 x 200 bitmap mode

16-bit home computer graphics
Mid-1980s to Mid-1990s

- Popular models: Commodore Amiga, Atari ST, Super Nintendo, Sega Megadrive
- More memory (512-1024 Kilobytes and more)
- More resolutions (320 x 200, 640 x 200, 640 x 400) and overscan modes
- Flexible use of video memory, 320 x 200 with 16 colours
- Adjustable palettes (e.g. 16 colours out of 4096)
- Bitplane graphics, consoles rely more on sprites
- TVs are still used

“bitmap/bitplane”

- 1 bit = 1 pixel, 8 bits = byte = 8 pixels

```
00111100 = 60
01000010 = 66
10100101 = 165
10000001 = 129
10111101 = 189
10000001 = 129
01000010 = 66
00111100 = 60
```

- Multiple bitplanes= more colors (2 planes=4, 3=8, 4=16)

Atari ST
ATARI 520ST
Commodore
Amiga 500+
(motherboard)
A500+
DENISE
PAULA
FAT AGNUS
ROM
DATA PATH
CLOCK
RESET
FLOPPY
RS232
EVEN CIA (B)
ODD CIA (A)
B52/ROCK LOBSTER

Cinemaware: *Defender of the Crown*, 1986

FTL: *Dungeon Master*, 1987

Bitmap Brothers: *The Chaos Engine*, Amiga, 1993

Bitmap Brothers: *The Chaos Engine*, Amiga, 1993

Traveller’s Tales: *Leander*, Amiga, 1991

DPaint
Color
UNDO
CLR

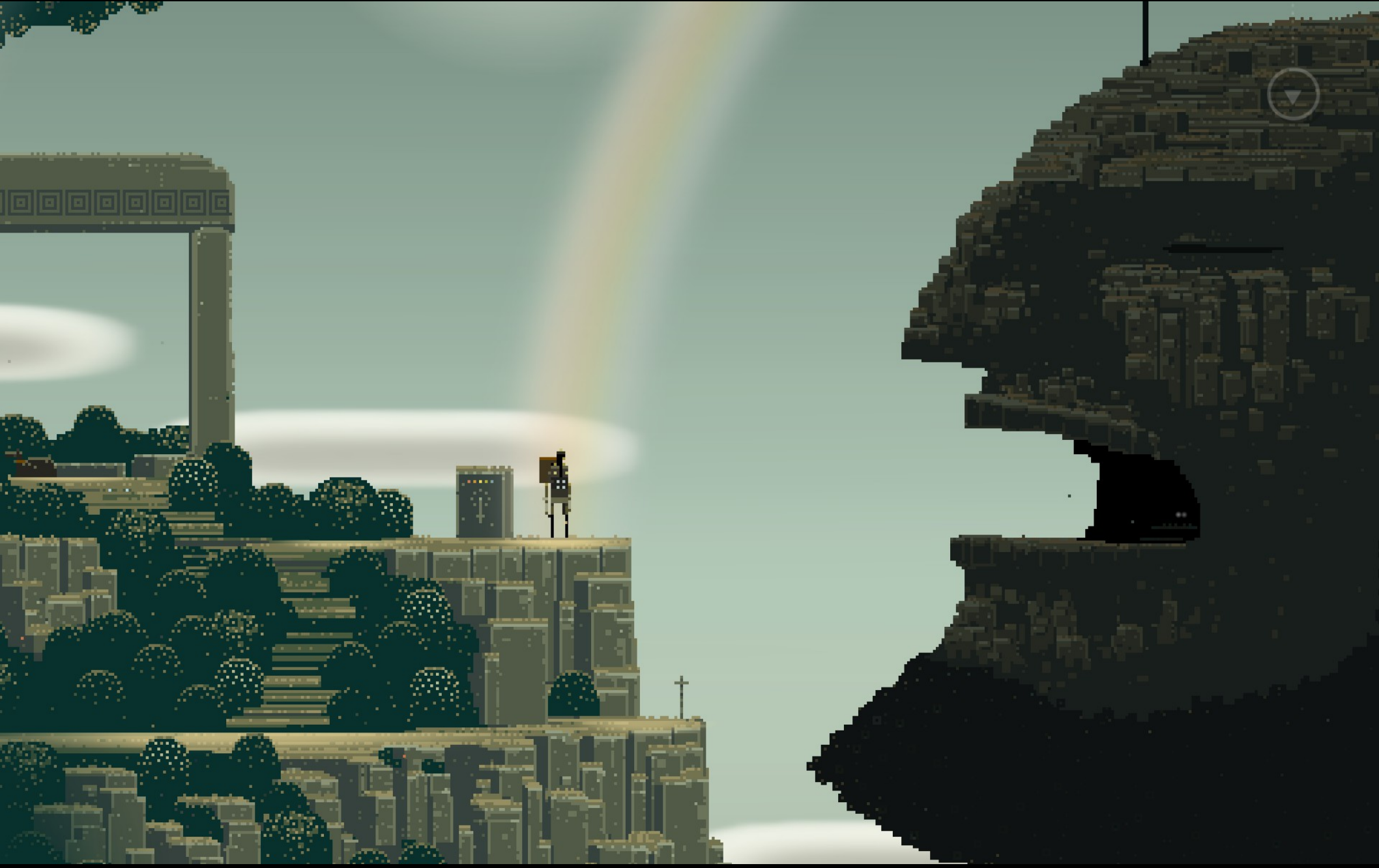
Deluxe Paint (Amiga, 1985)

- Used by both professionals and hobbyists
- *The definitive* pixeling program for the 16-bit computer era (In Europe and US)
- Combination of mouse and keyboard shortcuts, fast brushes
- Single images, tile graphics and sprite sheets
- Predecessors: *Superpaint* (Xerox Parc, 1970s), *Quantel Paintbox* (Quantel, 1981)

Pixel Art Now

- Hobbyist and demoscene graphics on original platforms (Commodore 64, Commodore Amiga and ZX Spectrum are popular)
- Also as a graphical style separated from the original platform limitations, used in many current indie games
  - Super Nintendo and PC VGA graphics seem to be common references

Free Lives/Devolver Digital: *Broforce*, PC/Mac/Linux, 2015



Super Brothers/Capybara GAmes: *Sword & Sworcery EP*, PC/Mac/Linux, 2011

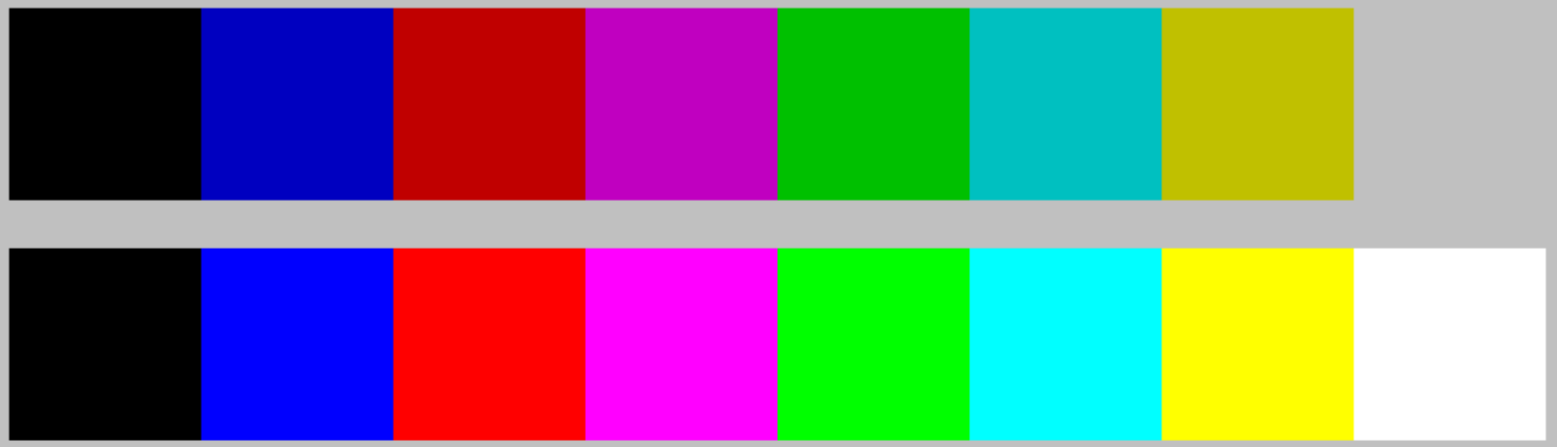
Terrible Toybox: *Thimbleweed Park*, PC/Mac/Linux, 2017

Case: Sinclair ZX Spectrum

- Introduced in 1982
- 16K and 48K models, later 128K model
- Z80 Processor at 3.5MHz
- Typical storage medium: Cassette tapes
- 256 x 192 pixel resolution, 32 x 24 colour resolution
- “1-bit RGB”, 8 colours, two brightnesses (except black)

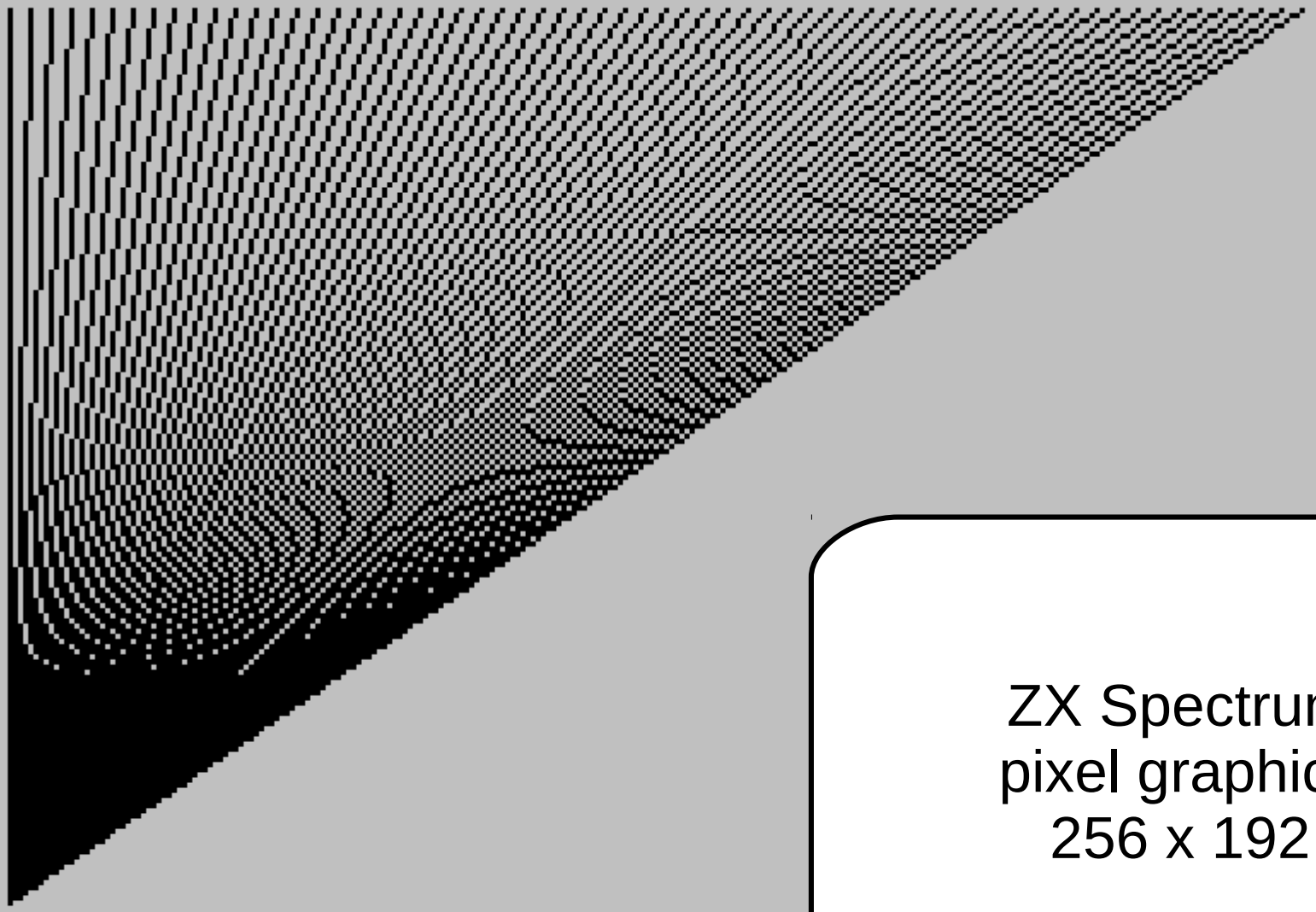
Case: Sinclair ZX Spectrum

- 256 x 192 pixel resolution, 32 x 24 colour resolution
- “1-bit RGB”, 8 colours, two brightnesses (except black)
- Two colours can exist on a single 8x8 pixel area
- These colours must be of the same brightness = the two different brightnesses cannot be combined
- Border colour

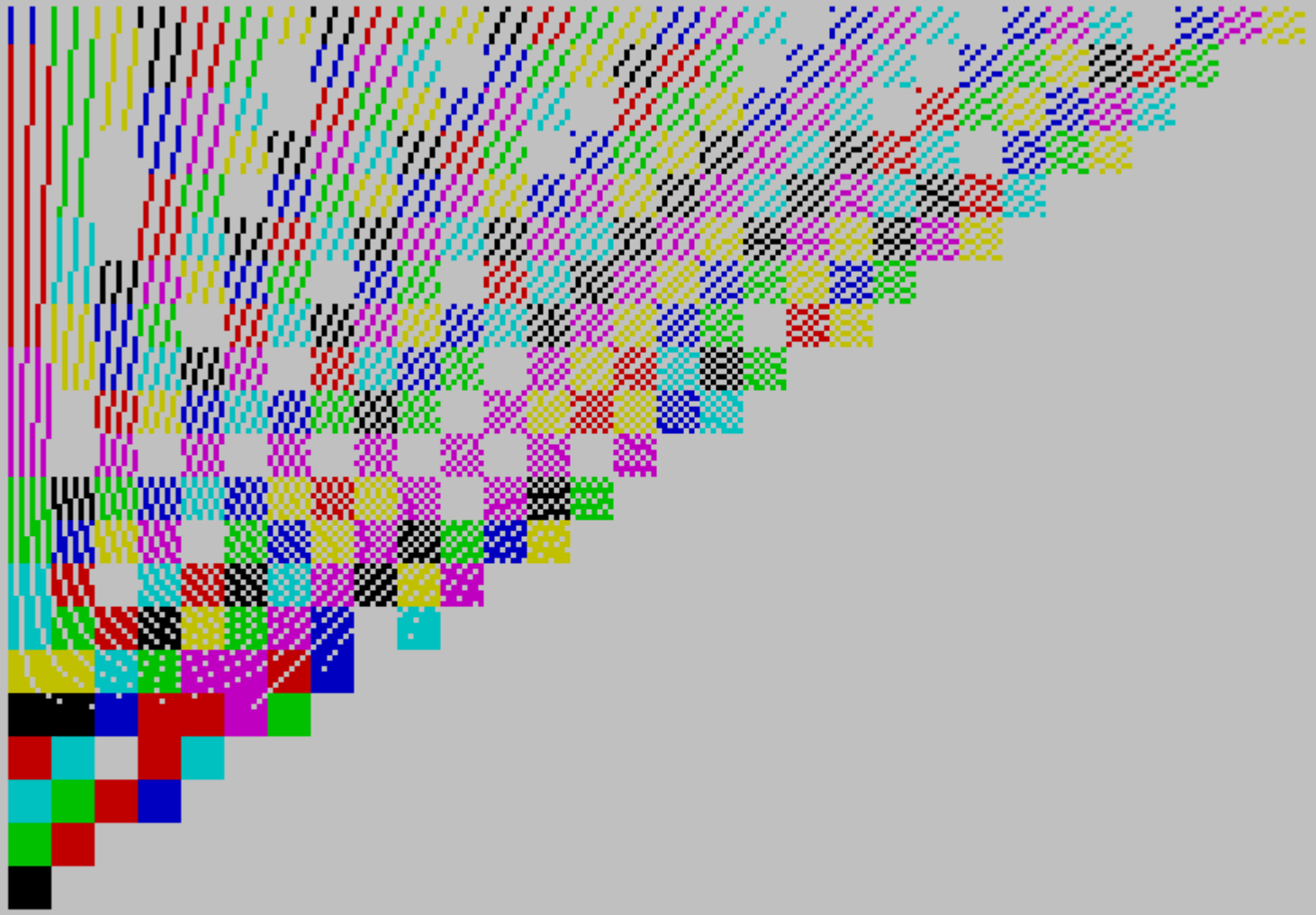


ZX Spectrum Colours:
8 colors,
Two brightness
Levels

0 OK, 60:1

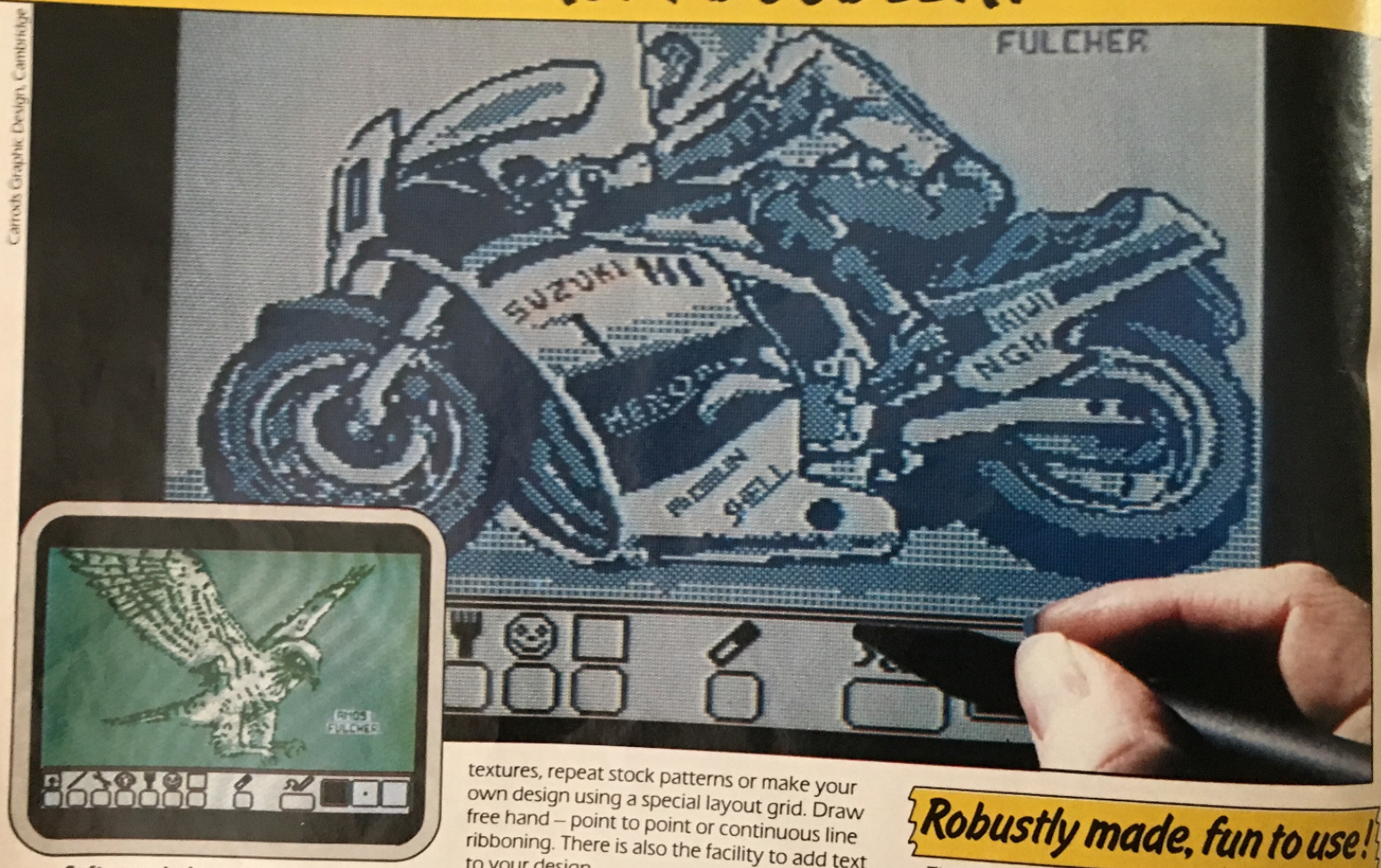


ZX Spectrum
pixel graphics
256 x 192



CREATE ELECTRONIC ART ON YOUR OWN TV SCREEN WITH THE SPECTRUM DOODLER!

Carrots Graphic Design, Cambridge



Software designed in conjunction with Sinclair Research

Draw straight on to your screen!

The Spectrum Doodler is a lightpen that enables you to draw straight on to your own tv or

textures, repeat stock patterns or make your own design using a special layout grid. Draw free hand – point to point or continuous line ribboning. There is also the facility to add text to your design.

Store your work on cassette or microdrive!

Robustly made, fun to use!

The lightpen is robust and comes complete with software on cassette which can be duplicated on to microdrive cassette. There is an instruction manual that's simple and easy to understand and an interface box for connection to your Spectrum computer. You can even write your own software for the Doodler if you wish.

To get your own Spectrum

ZX Spectrum full screen images

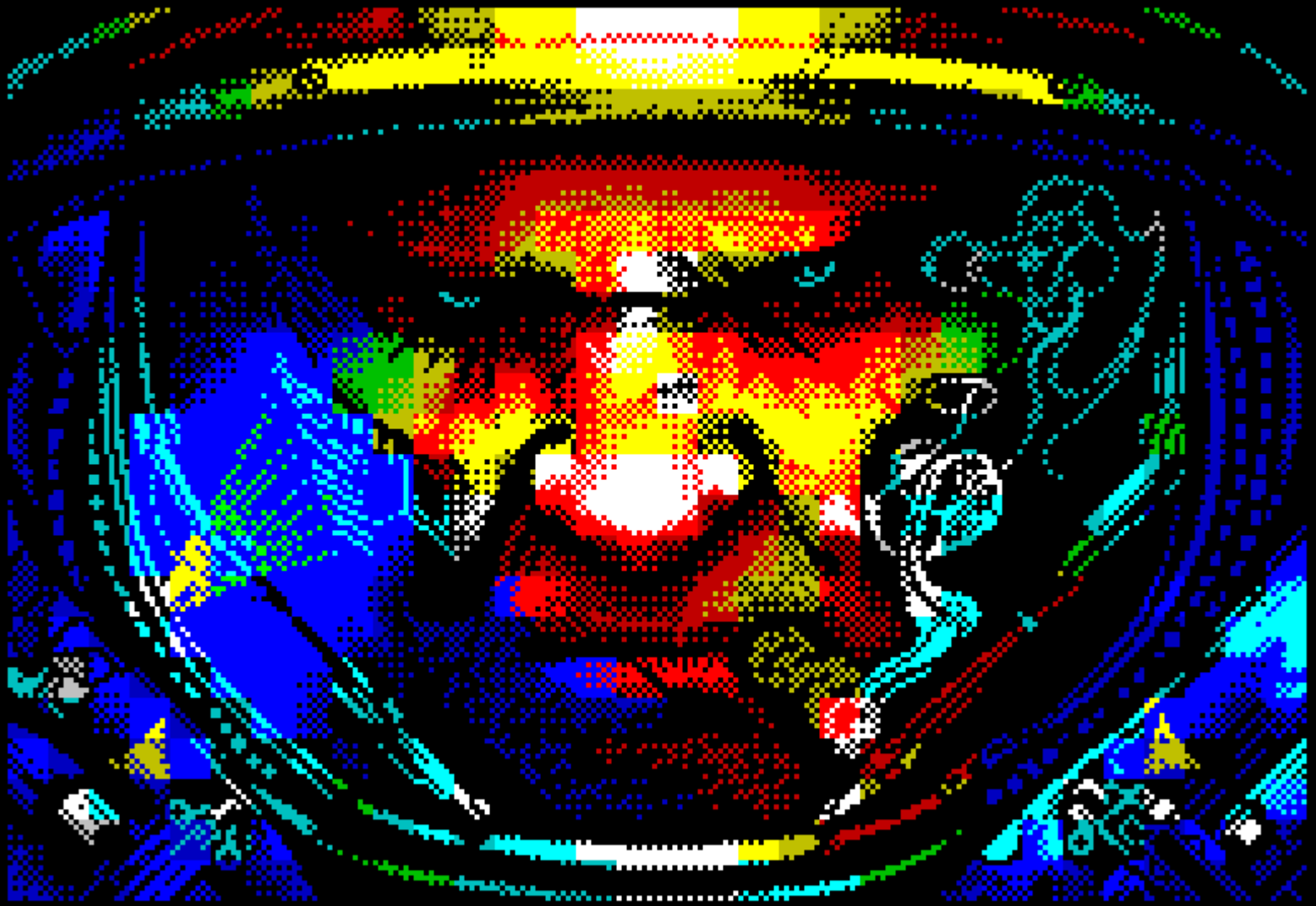
- 256 x 192 pixels, with 32 x 24 colour grid
- “1-bit RGB” = 8 colours in two brightnesses (except black)
- Then: Loading Screens, Title screens
- Now: Hobbyist images, Demoscene graphics, New Games

Unknown/Ultimate: *PSSST*, loading screen, 1983

F.D.Thorpe/Ocean: *Head over Heels*, loading screen, 1987

MAC: *Crystal Kingdom Dizzy*, remade loading screen, 2017

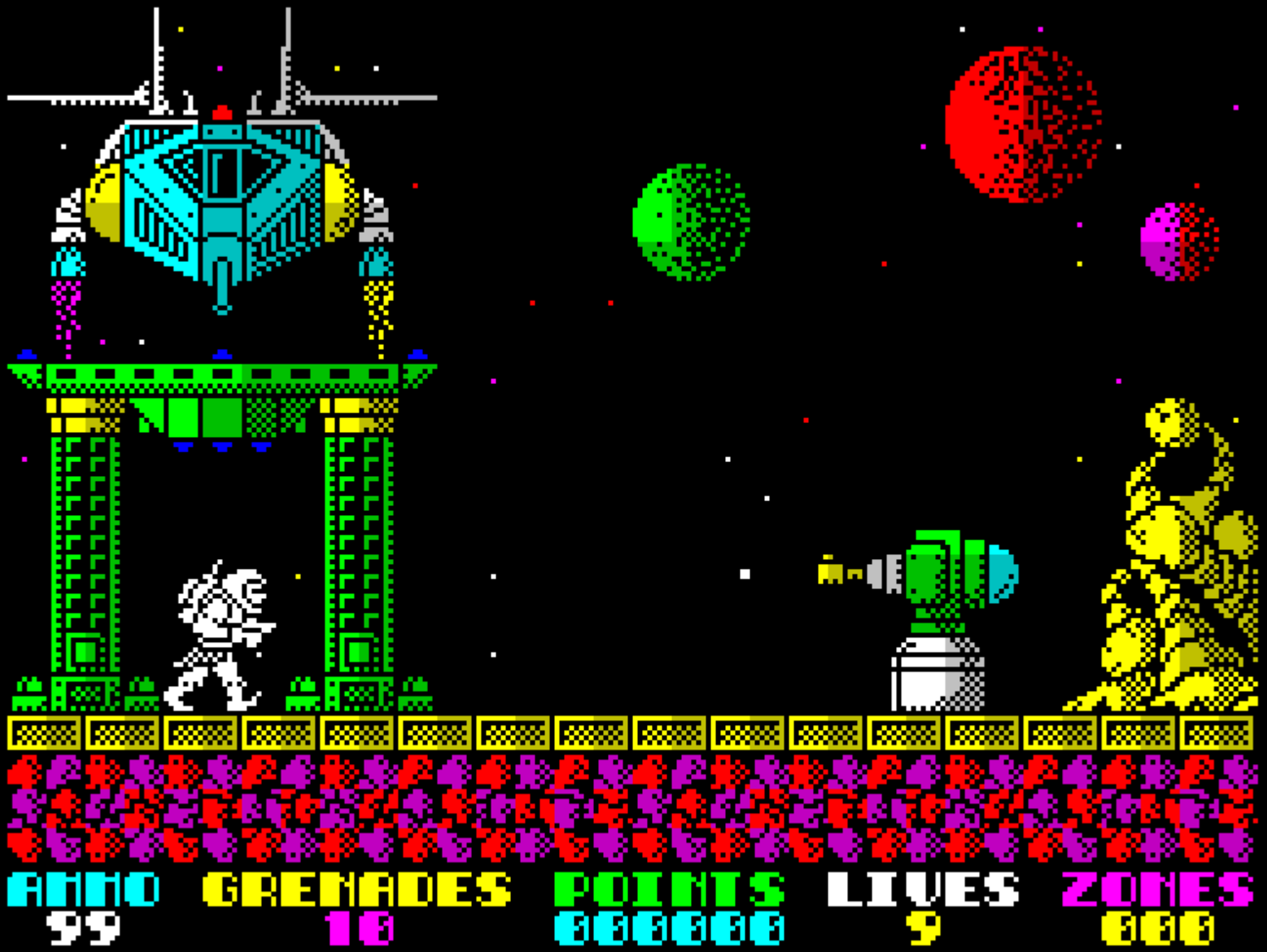
Piesiu: *Cursed Eighth*, 1st position at the Chaos Constructions 2010 party, Russia



diver/4d : *Mercenary 4. The Heaven's Devil,* 1st position at the Forever 2014 party, Slovakia

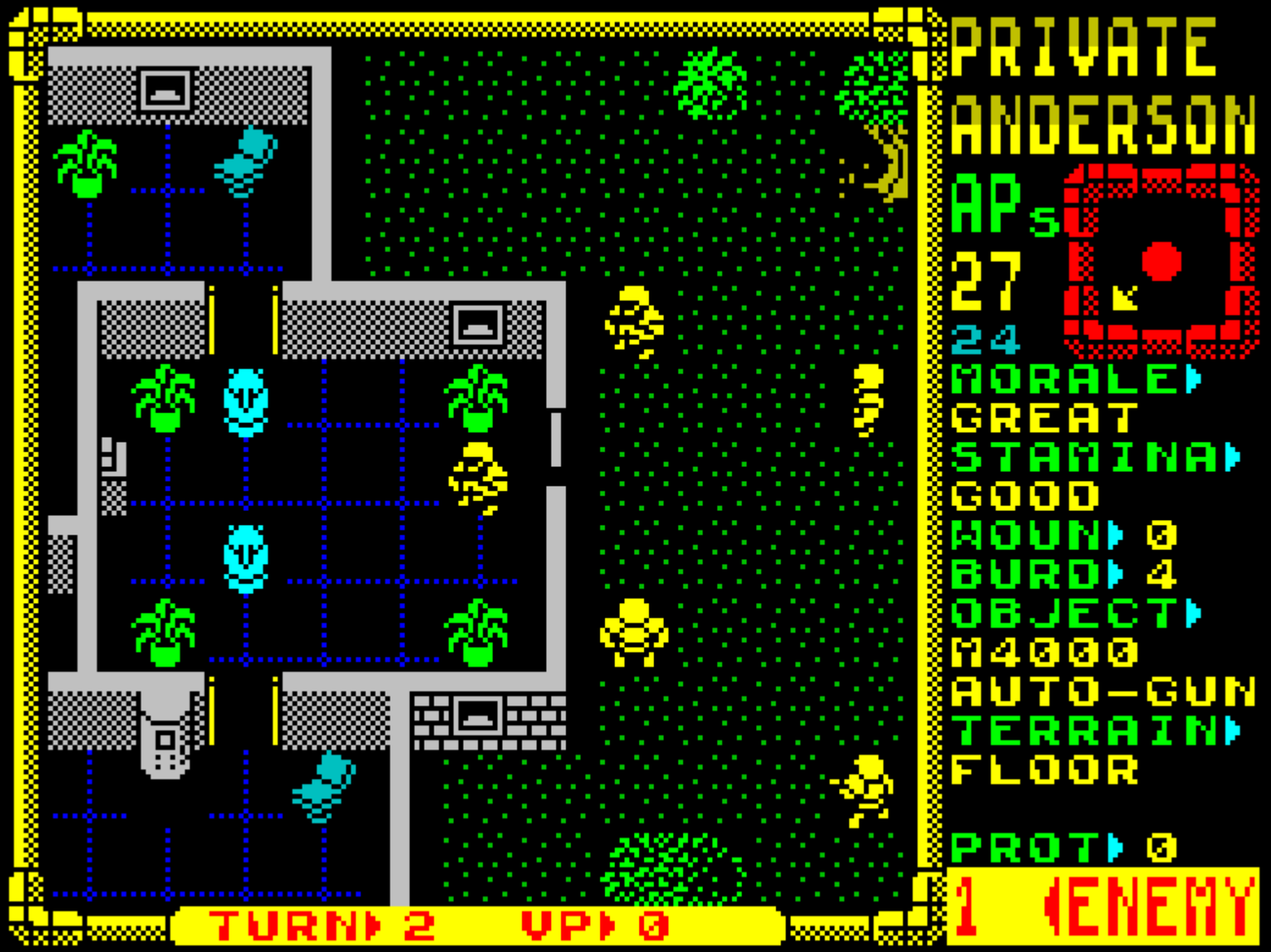
ZX Spectrum game graphics

- 256 x 192 pixels, with 32 x 24 colour grid
- “1-bit RGB” = 8 colours in two brightnesses (except black)
- No hardware sprites – every *change* needs to be done with the processor
- “Colour Clash”
- Black is often the easy background colour, as it “mediates” the two brightnesses

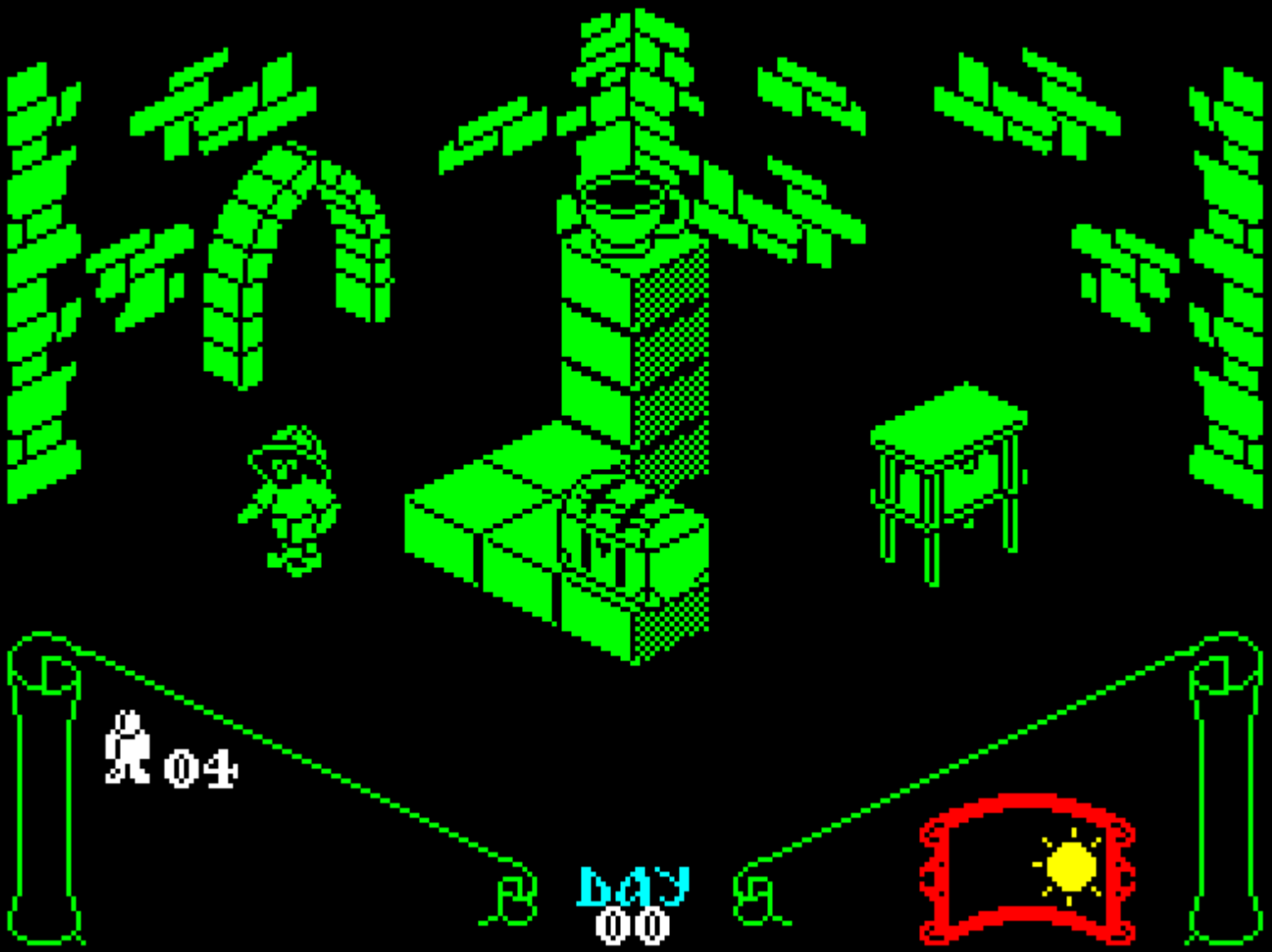


Raffaele Cecco/Hewson: *Exolon,* 1987

Mike Singleton/Beyond: *Lords of Midnight,* 1984



Julian Gollop/Target Games: *Laser Squad,* 1988



Ultimate: *Knight Lore*, 1984

Don Priestley/DK'Tronics: *Popeye,* 1985