

FOSDEM Retrocomputing developer's room



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2019-02-02

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About me

- Grown up with an Atari ST as first computer
- Atari Falcon owner in the mid 1990s
- Moved to Linux after Atari ST era was over
- Maintainer of Hatari from 2001 – 2010
(now still backup admin)



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Atari ST – What's that ?



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Bill Bertram
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The Atari machines

The original Atari ST:

- 8 Mhz 68000 CPU, 360 KB or 720 KB floppy
- Initially 512 kiB or 1 MiB RAM
(later „Mega“ models had up to 4 MiB RAM)
- 3 fixed screen resolutions:
mono, 4 colors, 16 colors (out of 512 possible)
- „Simple“ soundchip: Yamaha YM-2149



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The Atari machines

- ***STE:***

Like ST, but with sample sound, hardware scrolling, blitter chip, more color grades (4096 instead of 512)

- ***TT:***

32 Mhz 68030 CPU, more screen resolutions, FPU, real SCSI, more RAM, ...

- ***Falcon:***

16 Mhz 68030 CPU, DSP 56k, IDE hard disk, extended „Videl“ video chip ...



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History of Hatari

- 2001: Initial version, based on WinSTon and UAE CPU code, SourceForge project
- 2003: v0.30 / v0.40 – first „usable“ versions
- 2005: v0.80 – STE support
- 2007: v0.95 – Initial TT & Falcon support
- 2008: v1.0 – better CPU cycle emulation



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History of Hatari

- 2008 / 2009: v1.2 – moved to berlios.de, repository switched to Mercurial
- 2010: v1.4 – Nicolas becomes main admin
- 2012: v1.6 – moved to tuxfamily.org
- 2016: v2.0 – Switch to WinUAE CPU core, use SDL2 by default
- 2019: v2.2 – SCSI emulation, CI testing, ...



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How to use it

Get a TOS ROM (firmware first):

- TOS 1.00 - 1.04 for ST mode (or 2.06)
- TOS 1.06 - 2.06 for STE mode
- TOS 3.0x for TT mode
- TOS 4.0x for Falcon mode



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How to use it

Get a TOS ROM (firmware first):

- TOS 1.00 - 1.04 for ST mode (or 2.06)
- TOS 1.06 - 2.06 for STE mode
- TOS 3.0x for TT mode
- TOS 4.0x for Falcon mode
- Open source alternative for any machine:
EmuTOS – <http://emutos.sourceforge.net/>



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How to use it

- Software on floppy disk images:

*.st , *.msa , *.dim , *.stx , ...

→ `hatari -t tosfile.rom diskfile.msa`



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How to use it

- Software on floppy disk images:

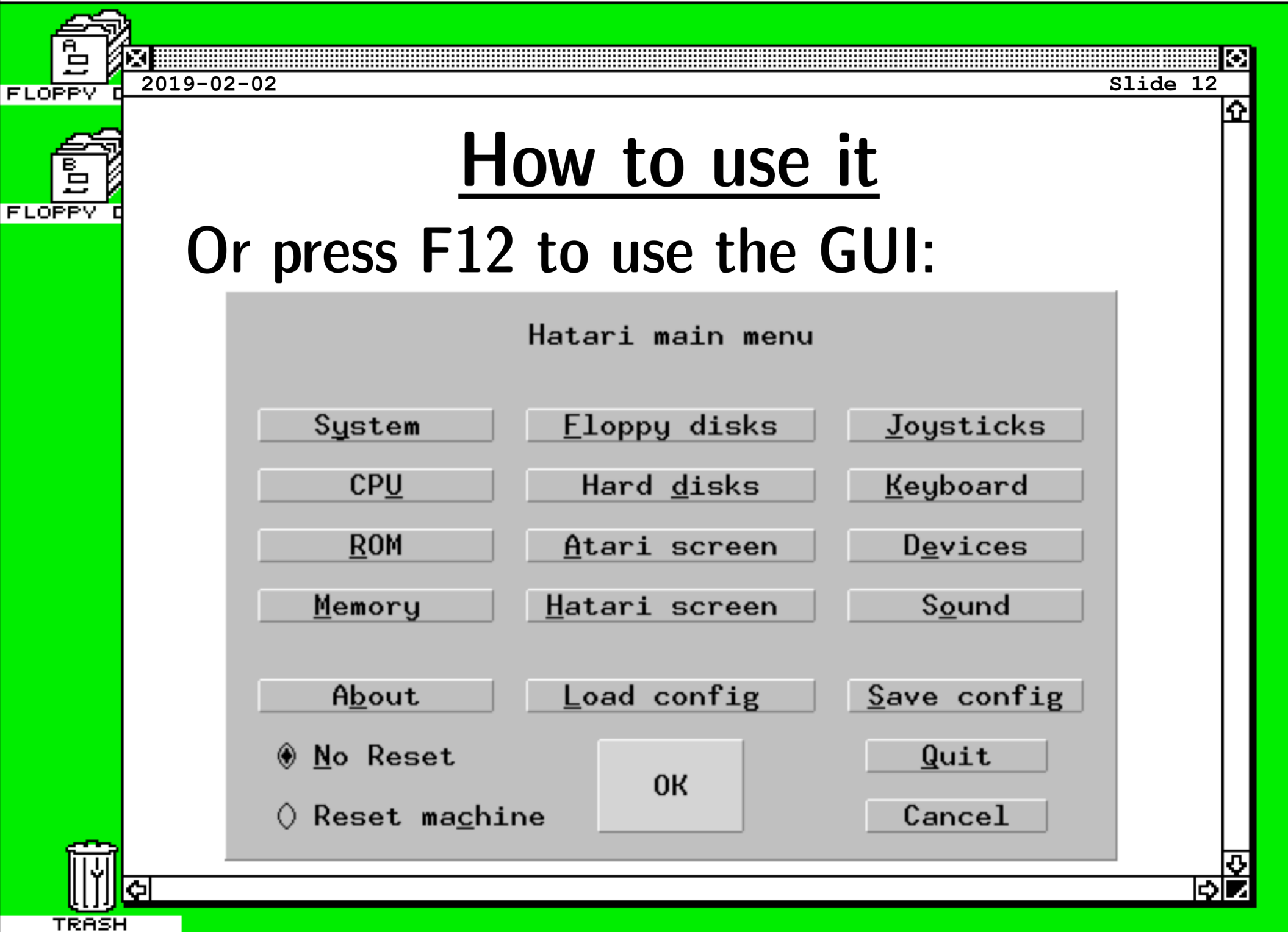
`*.st , *.msa , *.dim , *.stx , ...`

→ `hatari -t tosfile.rom diskfile.msa`

- Software on host file system:

Use the „GEMDOS HD“ emulation

→ `hatari -t tosfile.rom -d ~/folder`





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What's that fuss about cycle accuracy?

(or: why does it take so much host
CPU power to emulate old systems)



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Cycles?

- 8 Mhz CPU clock → 8 million cycles per second
- Each instruction takes a different amount:

MOVE.W #\$0700,\$00ff8240 # 20 cycles

LEA.L \$00ff8240,A0 # 12 cycles

MOVE.W #\$0700,(A0) # 12 cycles

MOVE.W #\$0700,D0 # 8 cycles

MOVEA.L #\$00ff8240,A0 # 12 cycles

MOVE.W D0,(A0) # 8 cycles





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Why cycle accuracy?

At a first glance, the ST is rather simple:

- Only three fixed resolutions:
 - 640 x 400 in monochrom, 71 Hz
 - 640 x 200 with 4 colors, 50 Hz or 60 Hz
 - 320 x 200 with 16 colors, 50 Hz or 60 Hz
- No hardware scrolling
- Rather simple sound chip



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Why cycle accuracy?

- Game and demo developers tried to overcome these limits!
- Sample sound possible by quickly changing the volume registers of the sound chip
- Overcome 16 colors by changing the palette while the electron beam runs over the screen
- ... and more graphical tricks ...



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horizontal line

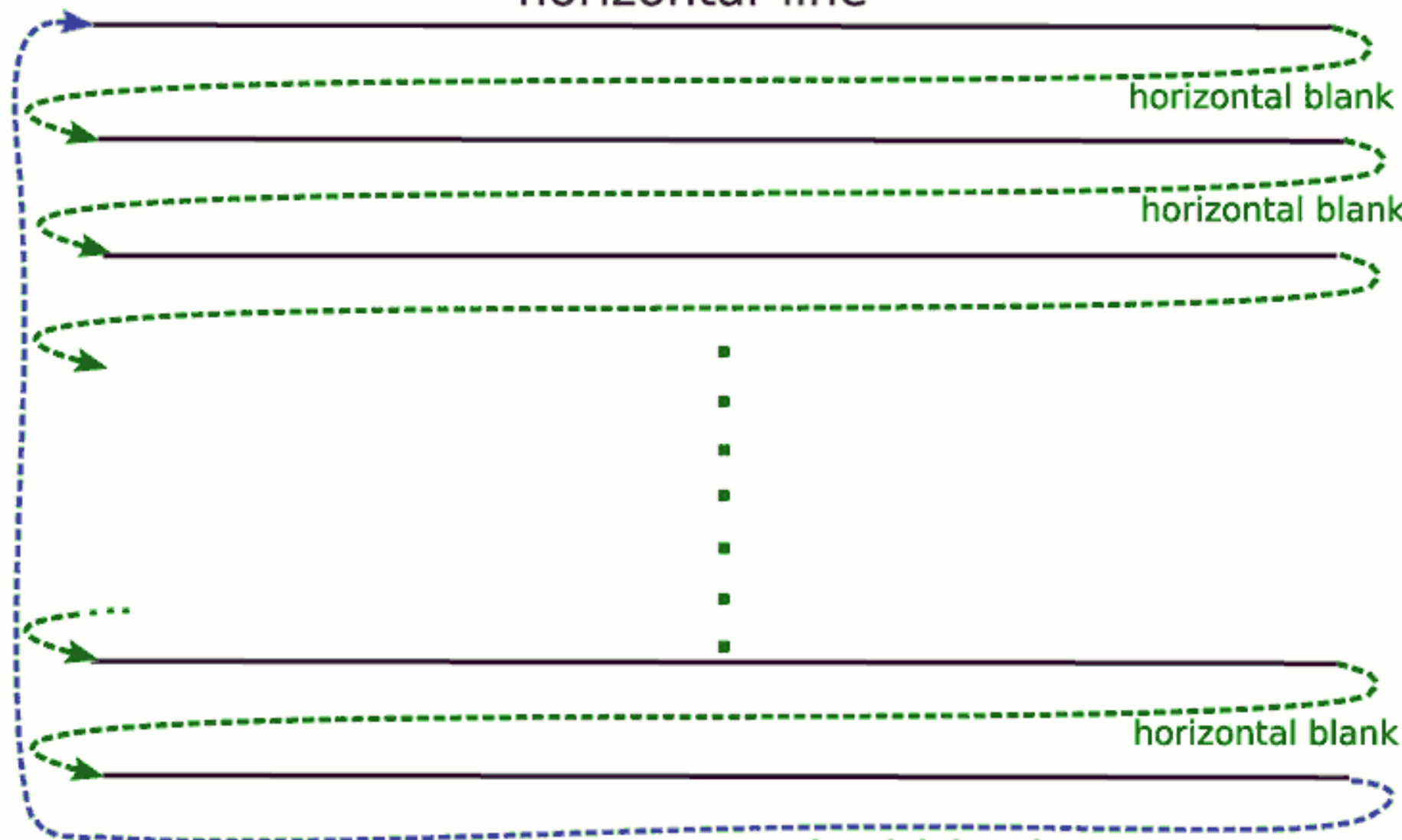
horizontal blank

horizontal blank

horizontal blank

vertical blank

⋮





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Spectrum 512 picture (60 Hz)



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... in Hatarì v0.90 ...



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Hatari v0.80: no 60 Hz support



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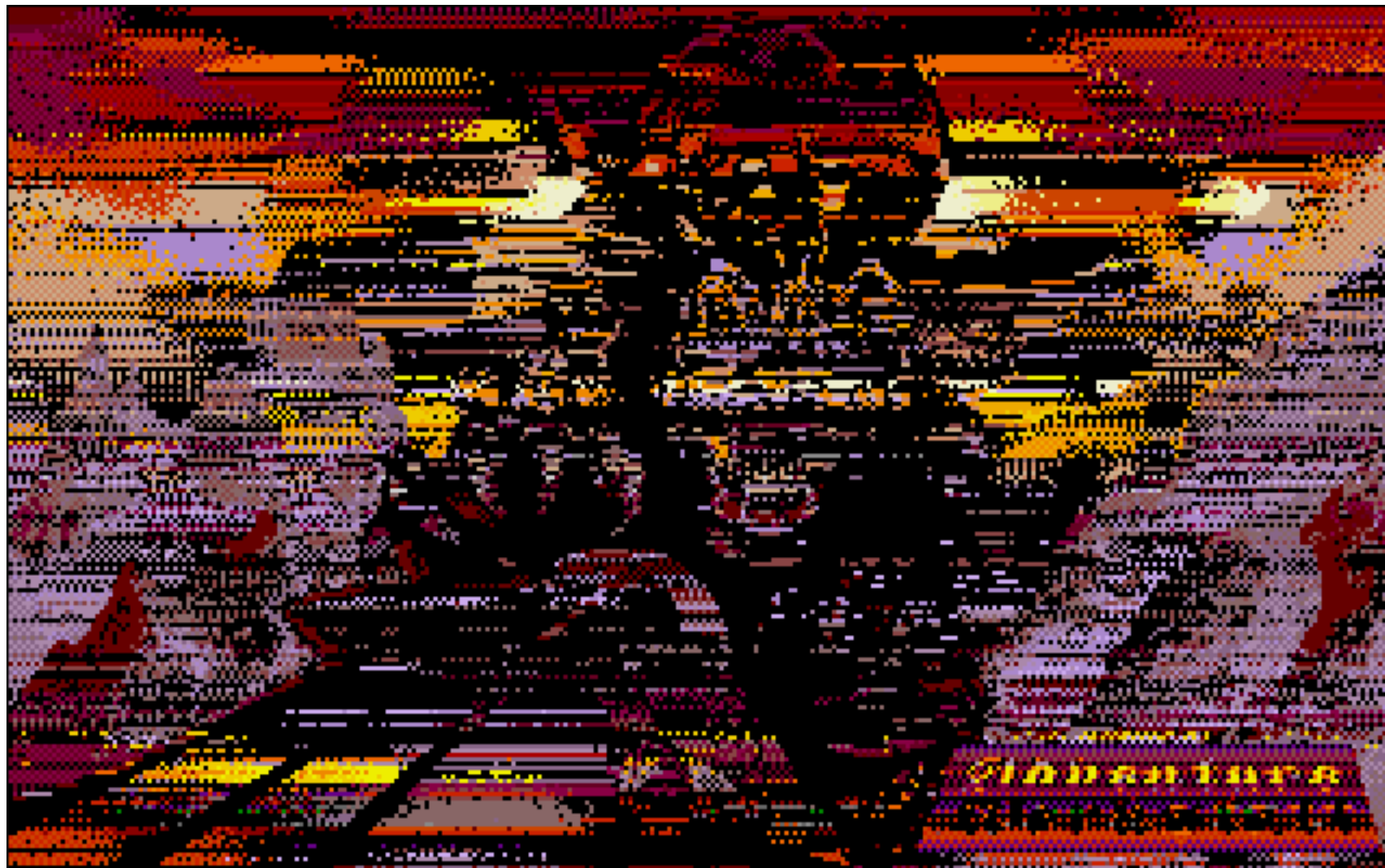


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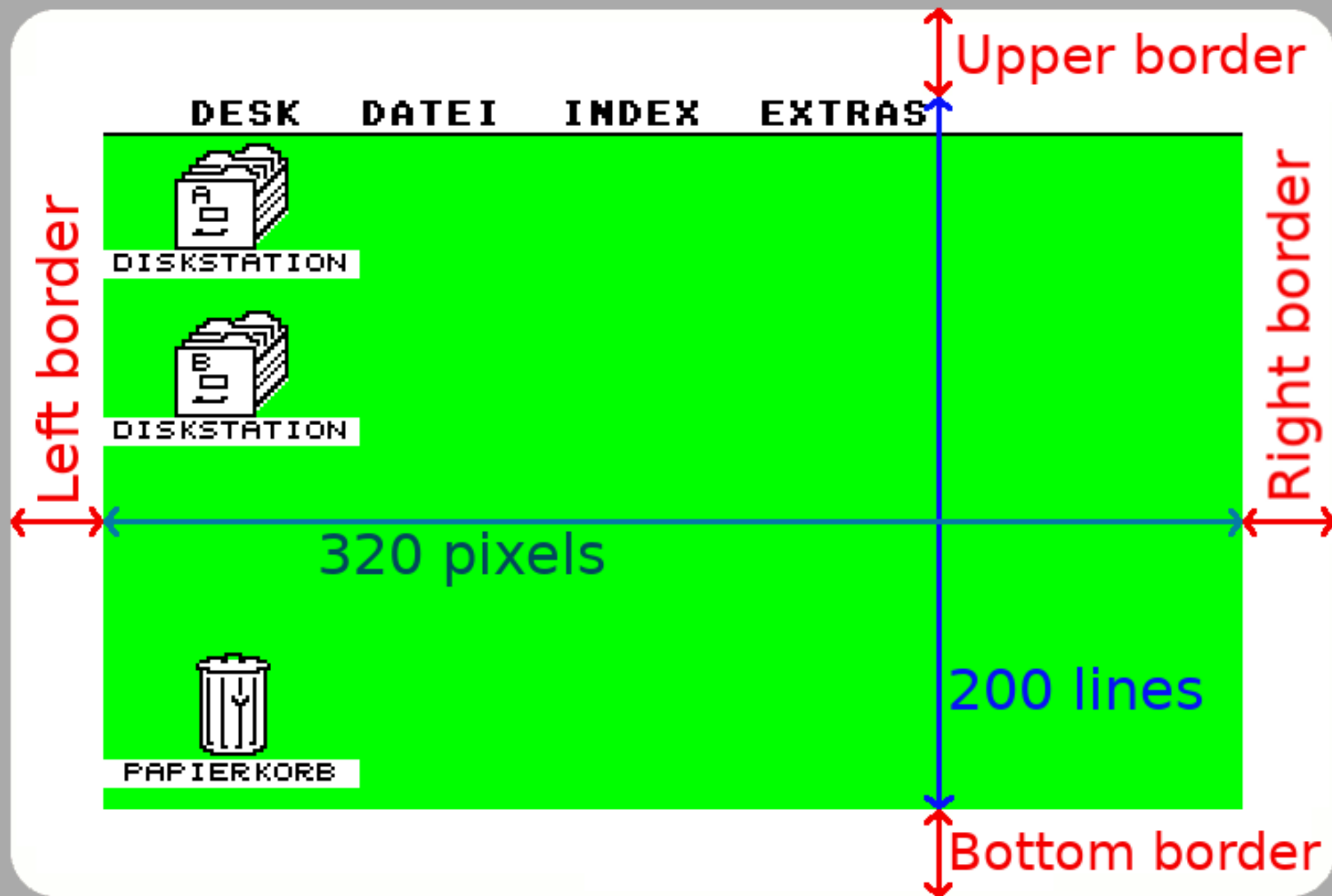
Without spec512 support



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More graphical tricks

- Borders removal (Overscan) by toggling 50 Hz ↔ 60 Hz at certain screen positions
- Plain ST can only „scroll“ by 8 lines vertically (screen address low byte register is missing)
- With overscan tricks in the upper border, the screen can also be moved by 1 line vertically
 - Sync scrolling technique
 - <https://www.youtube.com/watch?v=F4WJYyoF1Lk>





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Thanks for your attention!

Visit

<https://hatari.tuxfamily.org/>
for more information



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