

Steckschwein Pac-Man

Part 3 - Finale

- Hardware „Recap“
- Video-Chip V99x8 Hack
- Gameplay
- Level 256
- DIP-Switches
- Resume
- Portings

Steckschwein Pac-Man

Part 3 - Finale

Hardware

namco

CPU: Z80 @ 3.072 MHz

Sound: Namco WSG

224×288px, 16 colors

GPU: Namco NVC293 video shifter

8/64 sprites Video/RAM, 16x16px

4 colors per sprite,

sprite flipping

ROM: 16K Pac-Man

RAM: 4K - 2K RAM/2K Video

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CPU: 65c02 @ 10 MHz

Sound: YM3812

256×212px, 16 colors

VDP: Yamaha 9958

8/32 sprites Video, 16x16px

1 color per sprite

not supported

ROM: 512K

RAM: 512K RAM / 192K Video

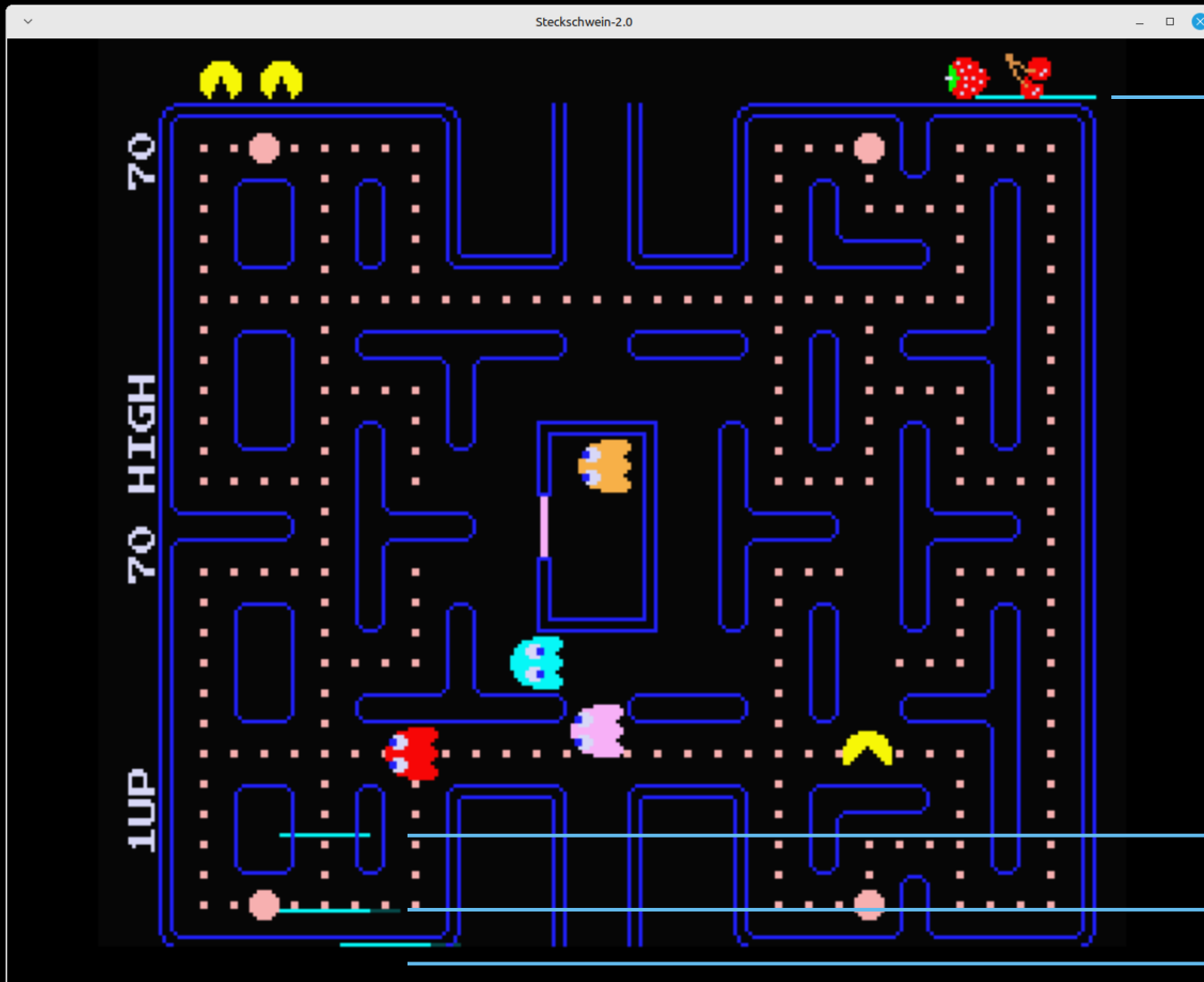
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V9938/V9958 – „wide screen hack“

- based on oldest C64 demo trick
- „open the border“
- V99x8 - R#9 Bit 7 LN - 192/212 scanlines
- V99x8 - R#9 Bit 1 *NT – PAL/NTSC mode

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V9938/V9958 – „wide screen hack“



line 253 – sprites on, video on
+26 scanlines => 238px

+ 3 char rows

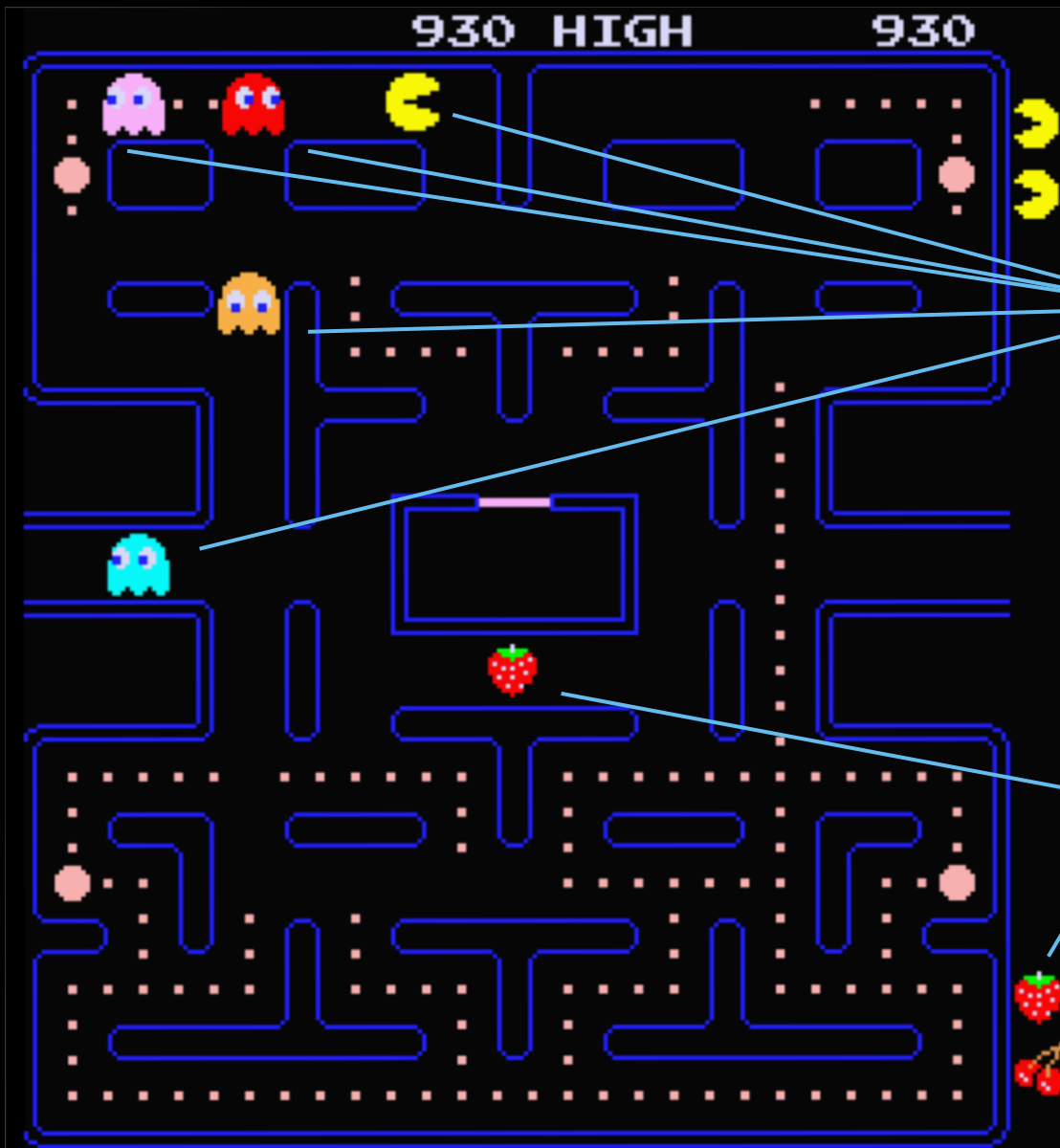
line 192 – set 212 line mode

line 212 – set 192 line mode

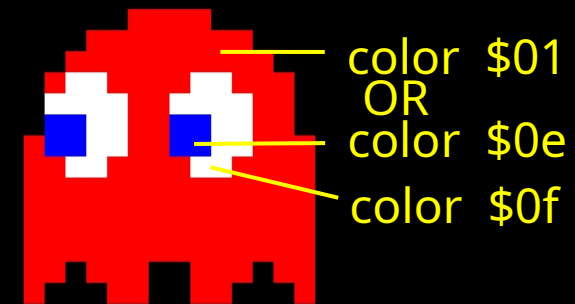
line 224 – sprite off, video off

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V9938/V9958 – Mode G4 - „hires mode“ / Sprite 2



9 Sprites – max 8 per scanline
2 Sprites per ghost - „color OR-ing“



„characters“ (hires)

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Gameplay – „state machine“

```
MAIN_LOOP:                JSR system_wait_vblank

                          LDA game_state+GameState::state
                          AND #STATE_PAUSE
                          BNE :+
                          JSR system_call_state_fn

:                          JSR gfx_prepare_update
                          JSR io_getkey
                          ... ; dispatch keyboard input

                          JMP MAIN_LOOP

system_call_state_fn:     JMP (game_state+GameState::fn_state)

game_pacman_dying:       LDA game_state+GameState::lives
                          BEQ @set_state
                          ...

@set_state                LDA #FN_STATE_GAME_OVER
                          JMP system_set_state_fn
                          ...

system_set_state_fn:     TAY
                          LDA system_state_table+0,Y
                          STA game_state+GameState::fn_state+0
                          LDA system_state_table+1,y
                          STA game_state+GameState::fn_state+1
                          LDA #0
                          STA game_state+GameState::state_frames
                          RTS
```

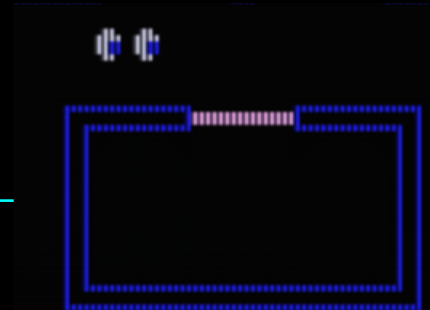
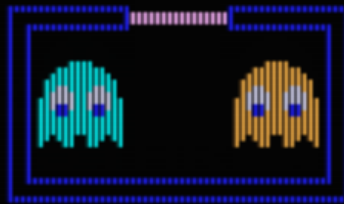
FN_STATE_NOOP	= \$00
FN_STATE_INIT	= \$02
FN_STATE_LEVEL_INIT	= \$04
FN_STATE_READY	= \$06
FN_STATE_DELAY	= \$08
FN_STATE_READY_WAIT	= \$0a
FN_STATE_PLAYING	= \$0c
FN_STATE_PACMAN_DYING	= \$0e
FN_STATE_LEVEL_CLEARED	= \$10
FN_STATE_GAME_OVER	= \$12
FN_STATE_GHOST_CATCHED	= \$14
FN_STATE_INTERLUDE_INIT	= \$16
FN_STATE_INTERLUDE	= \$18
FN_STATE_DEMO_INIT	= \$1a
FN_STATE_DEMO_PLAYING	= \$1c
FN_STATE_INTRO	= \$1e
FN_STATE_INTRO_GHOSTS	= \$20
FN_STATE_INTRO_GHOST_CATCHED	= \$22
FN_STATE_INTRO_SELECT_PLAYER	= \$24

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Gameplay – „state machine” ghost

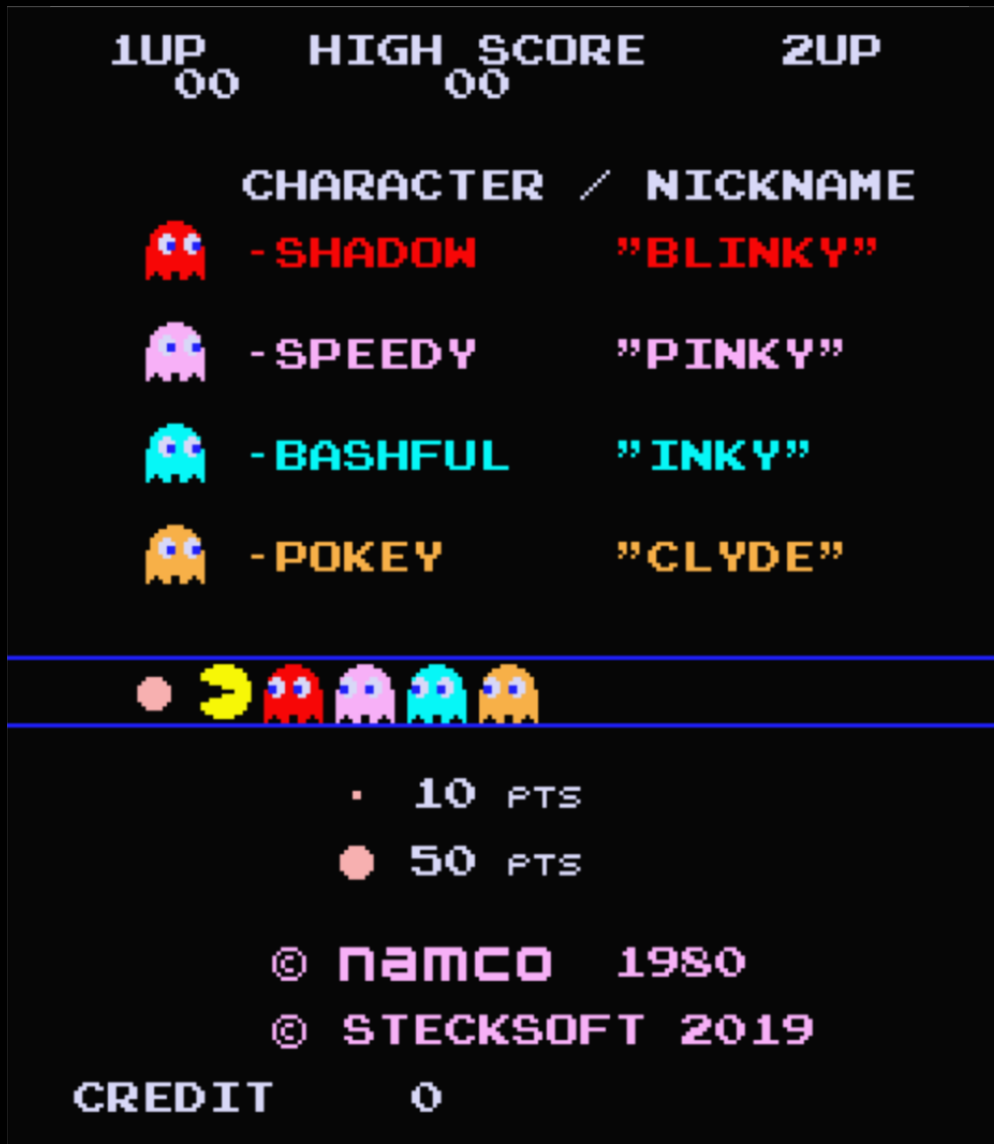
- each state - dedicated „state function“

GHOST_STATE_BASE	= 0
GHOST_STATE_RETURN	= 1
GHOST_STATE_LEAVE	= 2
GHOST_STATE_TARGET	= 3
GHOST_STATE_ENTER	= 4
GHOST_STATE_NOOP	= 5



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Gameplay – „intro“



- invisible tunnel

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Gameplay – „interlude“



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Level 256 - „Bug“

- 8 Bit overflow – level „0“



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8 Bit DIP-Switches

- 2 Bit „coinage“ – price for game(s)
 - 00 – free play
 - 01 – 1 coin, 2 credits
 - 10 – 1 coin, 1 credit
 - 11 – 2 coins, 1 credit
- 2 Bit „initial lives“ – amount of initial lives
 - 00 – 1 live
 - 01 – 2 lives
 - 10 – 3 lives
 - 11 – 5 lives
- 2 Bit „bonus life“ – pacman bonus life at points
 - 00 – 10.000 points
 - 01 – 15.000 points
 - 10 – 20.000 points
 - 11 – none
- 1 Bit „difficulty“ – difficulty and level select
- 1 Bit „ghost names“

METHOD OF PLAY			
SW. #1	SW. #2		
OFF	ON	1 COIN	1 PLAY
ON	OFF	1 COIN	2 PLAY
OFF	OFF	2 COINS	1 PLAY
ON	ON		FREEPLAY

NUMBER OF PACKMEN PER GAME		
SW. #3	SW. #4	
ON	ON	1 PACKMAN
OFF	ON	2 PACKMEN
ON	OFF	3 PACKMEN
OFF	OFF	5 PACKMEN

BONUS PACKMEN		
SW. #5	SW. #6	
ON	ON	BONUS PACKMAN AT 10,000
OFF	ON	BONUS PACKMAN AT 15,000
ON	OFF	BONUS PACKMAN AT 20,000
OFF	OFF	NO BONUS

PLAY MODE		
SW. #7	SW. #8	
OFF	OFF	PLAY MODE
ON	OFF	RACK TEST
OFF	ON	LOCKS PICTURE

M051-00932-A035

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Resume

- 6502 Pac-Man - „true to the original, 45 years later“

namco

Steckschwein

CPU: Z80 @ 3.072 MHz

CPU: 65c02 @ 3 MHz

Sound: Namco WSG

Sound: YM3812

224×288px, 16 Farben

238×256px, 16 Farben

GPU: Namco NVC293 video shifter

VDP: Yamaha 9958

8/64 sprites Video/RAM, 16x16px

8/32 sprites Video, 16x16px

4 colors per sprite,

1 color per sprite => overlay/multiplex

sprite flipping

not supported

ROM: 16K Pac-Man

● ROM: 16K pacman.prg

RAM: 4K - 2K RAM/2K Video

• RAM: 2K RAM / \$25 ZP RAM

Video: 32K Screen (Hires)
2K Sprites

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Portings – „still in progress“

- Junior Computer][

<http://retro.hansotten.nl/6502-sbc/elektuur-junior/build-a-junior/junior-computer-ii/>

- C64 with V9958 card

<https://github.com/vossi1/c64-v9958-card>

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Q&A

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... to be continued?