

SEGA Genesis Quick Reference

| Address | Read | Z80 memory | (byte accesses only) |
|--------------|------------------------|------------------------|----------------------|
| A00000..7FFF | Z80 memory | n/a | |
| A10001 | Hardware information | Controller 1 data | |
| A10003 | Controller 1 data | Controller 2 data | |
| A10005 | Controller 2 data | Controller 3 data | |
| A10007 | Controller 3 data | Controller 1 direction | |
| A10009 | Controller 1 direction | Controller 2 direction | |
| A1000B | Controller 2 direction | Controller 3 direction | |
| A1000D | Controller 3 direction | VDP data | |
| C00000..3 | VDP data | VDP control port | |
| C00004..7 | VDP status register | n/a | |
| C00008..9 | Beam position | | |

Hardware information:
 07 06 05 04 03 02 01 00

| | | | | |
|----|----|---|---|-------------|
| JP | PL | 0 | 0 | Version num |
|----|----|---|---|-------------|

 JP - Japanese model
 PL - Pal video model

Standard controller inputs:
 07 06 05 04 03 02 01 00

| | | | | | | | | |
|----|----|----|----|----|----|----|----|------------------|
| -- | BN | C | B | R | L | D | U | |
| 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 | BN = 1 |
| | | | | | | | | A - A-button |
| | | | | | | | | R - joypad Right |
| | | | | | | | | L - joypad Left |
| | | | | | | | | D - joypad Down |
| | | | | | | | | U - joypad Up |

 BN = 0

Status register:
 0F 0E 0D 0C 0B 0A 09 08 07 06 05 04 03 02 01 00

| | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|
| -- | OE | DD | TS | SC | VF | VB | HB | DA | PM |
|----|----|----|----|----|----|----|----|----|----|

 OE - data Queue Empty qf - data Queue Full
 TS - Too many Sprites SC - Sprite Collision
 VF - Video Field active VB - Vertical Blanking period
 HB - Horizontal Blanking period DA - Dma Active
 PM - Pal Mode

Beam position:
 0F 0E 0D 0C 0B 0A 09 08 07 06 05 04 03 02 01 00

| | |
|-------------------|---------------------|
| vertical position | horizontal position |
|-------------------|---------------------|

Control port VDP RAM access:
 1F 1E 1D 1C 1B 1A 19 18 17 16 15 14 13 12 11 10

| | | | | | | | | | | | | | | | | |
|----|----|-----------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|---|
| CM | WR | VDP address bits D..0 | | | | | | | | | | | | | | |
| 0F | 0E | 0D | 0C | 0B | 0A | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

 CM - Color ram Write
 WR - Write
 SD - Start Dma
 CR - Color ram Read
 VR - Vert. scroll Ram
 VA - Vdp adr bits F..E

Control port register writes:
 0F 0E 0D 0C 0B 0A 09 08 07 06 05 04 03 02 01 00

| | | | | |
|---|---|---|-------------|---------------|
| 1 | 0 | 0 | reg. number | register data |
|---|---|---|-------------|---------------|

Register \$80xx: VDP REG_00
 07 06 05 04 03 02 01 00

| | | | | | | | |
|---|---|---|----|---|---|---|---|
| 0 | 0 | 0 | HE | 0 | 1 | 0 | 0 |
|---|---|---|----|---|---|---|---|

 HE - Horizontal blank interrupt Enable

Register \$81xx: VDP REG_01
 07 06 05 04 03 02 01 00

| | | | | | | | |
|---|----|----|----|---|---|---|---|
| 0 | DO | VE | DE | 0 | 1 | 0 | 0 |
|---|----|----|----|---|---|---|---|

 DO - Display Output enable
 VE - Vertical blank interrupt Enable
 DE - Dma Enable

Register \$82xx: VDP PFA_BASE
 07 06 05 04 03 02 01 00

| | | | | | | |
|---|---|-----|------|---|---|---|
| 0 | 0 | PFA | base | 0 | 0 | 0 |
|---|---|-----|------|---|---|---|

 PFA - Playfield A

Register \$83xx: VDP LWD_BASE
 07 06 05 04 03 02 01 00

| | | | | | | |
|---|---|--------|------|---|---|---|
| 0 | 0 | window | base | 0 | 0 | 0 |
|---|---|--------|------|---|---|---|

Register \$84xx: VDP PFB_BASE
 07 06 05 04 03 02 01 00

| | | | | | |
|---|---|---|---|-----|------|
| 0 | 0 | 0 | 0 | PFB | base |
|---|---|---|---|-----|------|

 PFB - Playfield B

Register \$85xx: VDP SPR_BASE
 07 06 05 04 03 02 01 00

| | | | | |
|---|--------|-------|------|---|
| 0 | sprite | table | base | 0 |
|---|--------|-------|------|---|

Register \$8600: VDP_REG_06 (must be \$00)
 Register \$87xx: VDP_BKGD_COLOR
 07 06 05 04 03 02 01 00

| | | | |
|---|---|-------|-------|
| 0 | 0 | palet | color |
|---|---|-------|-------|

Register \$8800: VDP_REG_08 (must be \$00)
 Register \$8900: VDP_REG_09 (must be \$00)
 07 06 05 04 03 02 01 00
 Register \$8Axx: VDP_HBL_SKIP

| | | |
|------------|------|-------|
| horizontal | skip | count |
|------------|------|-------|

Register \$8Bxx: VDP SCRL_MODE
 07 06 05 04 03 02 01 00

| | | | | | | |
|---|---|---|---|----|----|----|
| 0 | 0 | 0 | 0 | EI | VF | HF |
|---|---|---|---|----|----|----|

EI - External Interrupt enable
 VF - Vertical scroll format (0= full screen,
 1= 2-column mode)
 HF - Horizontal scroll format (0= full screen,
 1= tile row, 3= scanline)

Register \$8Cxx: VDP DISP_MODE
 07 06 05 04 03 02 01 00

| | | | | | | |
|----|---|---|---|----|----|----|
| 4C | 0 | 0 | 0 | ST | IM | 4C |
|----|---|---|---|----|----|----|

4C - 40-column screen
 ST - Shadow/Transparency mode
 IM - Interlace Mode (0= non-interlace,
 1= interlace, 3= double-resolution)

Register \$8Dxx: VDP HSCL_BASE
 07 06 05 04 03 02 01 00

| | | | | |
|---|---|-------|--------|------|
| 0 | 0 | horz. | scroll | base |
|---|---|-------|--------|------|

Register \$8E00: VDP_REG_0E (must be \$00)

Register \$8Fxx: VDP_DMA_STEP
 07 06 05 04 03 02 01 00

| | | | |
|-----|------|-----------|------|
| DMA | auto | increment | size |
|-----|------|-----------|------|

Register \$90xx: VDP_PF_SIZE
 07 06 05 04 03 02 01 00

| | | | | | |
|---|---|----|---|---|----|
| 0 | 0 | VS | 0 | 0 | HS |
|---|---|----|---|---|----|

VS - Vertical playfield size (0= 32-row,
 1= 64-row, 3=128-row)
 HS - Horizontal playfield size (0= 32-column,
 1= 64-column, 3=128-column)

Register \$91xx: VDP_LMD_HEDGE
 07 06 05 04 03 02 01 00

| | | | | | |
|----|---|---|-----|-------|----|
| WR | 0 | 0 | lmd | ovrly | sz |
|----|---|---|-----|-------|----|

WL - Window starts from the right.
 Window overlay size is 0..19 tile columns and
 multiplied by 2.

Register \$92xx: VDP_LMD_VEDGE
 07 06 05 04 03 02 01 00

| | | | | | |
|----|---|---|-----|-------|----|
| WB | 0 | 0 | lmd | ovrly | sz |
|----|---|---|-----|-------|----|

WL - Window starts from the right.
 Window overlay size is 0..27 tile rows.

Register \$93xx: VDP_DMA_LEN_L
 Register \$94xx: VDP_DMA_LEN_H
 Register \$95xx: VDP_DMA_SRC_L
 Register \$96xx: VDP_DMA_SRC_H
 Register \$97xx: VDP_DMA_SRC_H

\$80 = fill mode, \$C0 = VRAM to VRAM copy mode

Sprite table entries:

Word 0:
 0F 0E 0D 0C 0B 0A 09 08 07 06 05 04 03 02 01 00

| | | | | | | | |
|---|---|---|---|---|---|----------|----------|
| 0 | 0 | 0 | 0 | 0 | 0 | vertical | position |
|---|---|---|---|---|---|----------|----------|

Word 1:
 0F 0E 0D 0C 0B 0A 09 08 07 06 05 04 03 02 01 00

| | | | | | | | |
|---|---|---|---|-------|-------|--------|------|
| 0 | 0 | 0 | 0 | HSIZE | VSIZE | sprite | link |
|---|---|---|---|-------|-------|--------|------|

HSIZE - tile width-1
 VSIZE - tile height-1

Word 2:
 0F 0E 0D 0C 0B 0A 09 08 07 06 05 04 03 02 01 00

| | | | | | |
|----|-------|----|----|------|-------|
| PR | palet | VF | HF | tile | index |
|----|-------|----|----|------|-------|

PR - Priority
 VF - Vertical Flip
 HF - Horizontal Flip

Word 3:
 0F 0E 0D 0C 0B 0A 09 08 07 06 05 04 03 02 01 00

| | | | | | | |
|---|---|---|---|---|------------|----------|
| 0 | 0 | 0 | 0 | 0 | horizontal | position |
|---|---|---|---|---|------------|----------|

Map tile entries
 0F 0E 0D 0C 0B 0A 09 08 07 06 05 04 03 02 01 00

| | | | | | |
|----|-------|----|----|------|-------|
| PR | palet | VF | HF | tile | index |
|----|-------|----|----|------|-------|

PR - Priority
 VF - Vertical Flip
 HF - Horizontal Flip