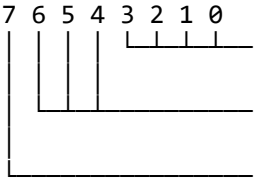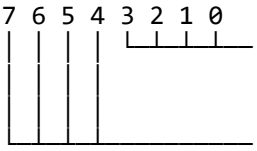# MSX Assembly Page

MSX System Variables

This is an overview of the system variables which you can use. They are official, unless mentioned otherwise.

VDP Registers: R#0-R#7, R#8-R#23, R#25-R#27, R#32-R#45 (not mirrored in system ram), S#0.

MSX System Variables located in Main ROM

Name	Address	Length	Description
CGTABL	#0004	2	Base address of the MSX character set in ROM
VDP.DR	#0006	1	Base port address for VDP data read
VDP.DW	#0007	1	Base port address for VDP data write
| | #002B | 1 | Basic ROM version<br><br>```
7 6 5 4 3 2 1 0
| | | | |_|_|_|_|— Character set
| | | |     0 = Japanese, 1 = International, 2=Korean
| | | |———— Date format
| | |        0 = Y-M-D, 1 = M-D-Y, 2 = D-M-Y
| |——————— Default interrupt frequency
|            0 = 60Hz, 1 = 50Hz
``` |
| | #002C | 1 | Basic ROM version<br><br>```
7 6 5 4 3 2 1 0
| | | | |_|_|_|_|— Keyboard type
| | | |     0 = Japanese, 1 = International
| | | |     2 = French (AZERTY), 3 = UK, 4 = German (DIN)
| | |———————— Basic version
|            0 = Japanese, 1 = International
``` |
	#002D	1	MSX version number 0 = MSX 1 1 = MSX 2 2 = MSX 2+ 3 = MSX turbo R
	#002E	1	Bit 0: if 1 then MSX-MIDI is present internally (MSX turbo R only)
	#002F	1	Reserved
CHAR_16	#0034	4	Default KANJI range. Copied to KANJTABLE by the DiskBIOS on boot.

MSX System Variables located in Sub ROM

Name	Address	Length	Description
	#0000	2	String "CD", identification of MSX Sub ROM
	#0002	2	Execution address for the startup screen on MSX 2, MSX 2+ or MSX turbo R. This is unofficial and undocumented.

MSX-DOS (DiskROM) System Variables located in RAM

These addresses are only initialized when a DiskROM is present (e.g. when the machine has a diskdrive or a harddisk interface connected).

Name	Address	Length	Description

KANJTABLE	#F30F	4	Two pairs of limits for the first bytes of Shift-JIS characters. See here and here for more information.
RAMAD0	#F341	1	Slot address of RAM in page 0 (DOS)
RAMAD1	#F342	1	Slot address of RAM in page 1 (DOS)
RAMAD2	#F343	1	Slot address of RAM in page 2 (DOS/BASIC)
RAMAD3	#F344	1	Slot address of RAM in page 3 (DOS/BASIC)
MASTER	#F348	1	Main DiskROM slot address

MSX System Variables located in RAM

This is the start of the MSX BIOS system area.

Name	Address	Length	Description
RDPRIM	#F380	5	Routine that reads from a primary slot
WRPRIM	#F385	7	Routine that writes to a primary slot
CLPRIM	#F38C	14	Routine that calls a routine in a primary slot
USRTAB	#F39A	2	Address to call with Basic USR0
	#F39C	2	Address to call with Basic USR1
	#F39E	2	Address to call with Basic USR2
	#F3A0	2	Address to call with Basic USR3
	#F3A2	2	Address to call with Basic USR4
	#F3A4	2	Address to call with Basic USR5
	#F3A6	2	Address to call with Basic USR6
	#F3A8	2	Address to call with Basic USR7
	#F3AA	2	Address to call with Basic USR8
	#F3AC	2	Address to call with Basic USR9
LINL40	#F3AE	1	Width for SCREEN 0 (default 37)
LINL32	#F3AF	1	Width for SCREEN 1 (default 29)
LINLEN	#F3B0	1	Width for the current text mode
CRTCNT	#F3B1	1	Number of lines on screen
CLMLST	#F3B2	1	Column space. It's uncertain what this address actually stores
TXTNAM	#F3B3	2	BASE(0) - SCREEN 0 name table
TXTCOL	#F3B5	2	BASE(1) - SCREEN 0 color table
TXTCGP	#F3B7	2	BASE(2) - SCREEN 0 character pattern table
TXTATR	#F3B9	2	BASE(3) - SCREEN 0 Sprite Attribute Table
TXTPAT	#F3BB	2	BASE(4) - SCREEN 0 Sprite Pattern Table
T32NAM	#F3BD	2	BASE(5) - SCREEN 1 name table
T32COL	#F3BF	2	BASE(6) - SCREEN 1 color table
T32CGP	#F3C1	2	BASE(7) - SCREEN 1 character pattern table
T32ATR	#F3C3	2	BASE(8) - SCREEN 1 sprite attribute table
T32PAT	#F3C5	2	BASE(9) - SCREEN 1 sprite pattern table
GRPNAM	#F3C7	2	BASE(10) - SCREEN 2 name table
GRPCOL	#F3C9	2	BASE(11) - SCREEN 2 color table
GRPCGP	#F3CB	2	BASE(12) - SCREEN 2 character pattern table
GRPATR	#F3CD	2	BASE(13) - SCREEN 2 sprite attribute table
GRPPAT	#F3CF	2	BASE(14) - SCREEN 2 sprite pattern table
MLTNAM	#F3D1	2	BASE(15) - SCREEN 3 name table
MLTCOL	#F3D3	2	BASE(16) - SCREEN 3 color table
MLTCGP	#F3D5	2	BASE(17) - SCREEN 3 character pattern table
MLTATR	#F3D7	2	BASE(18) - SCREEN 3 sprite attribute table
MLTPAT	#F3D9	2	BASE(19) - SCREEN 3 sprite pattern table
CLIKSW	#F3DB	1	=0 when key press click disabled =1 when key press click enabled SCREEN ,,n will write to this address
CSRY	#F3DC	1	Current row-position of the cursor
CSRX	#F3DD	1	Current column-position of the cursor
CNSDFG	#F3DE	1	=0 when function keys are not displayed =1 when function keys are displayed

RG0SAV	#F3DF	1	Mirror of VDP register 0 (Basic: VDP(0))
RG1SAV	#F3E0	1	Mirror of VDP register 1 (Basic: VDP(1))
RG2SAV	#F3E1	1	Mirror of VDP register 2 (Basic: VDP(2))
RG3SAV	#F3E2	1	Mirror of VDP register 3 (Basic: VDP(3))
RG4SAV	#F3E3	1	Mirror of VDP register 4 (Basic: VDP(4))
RG5SAV	#F3E4	1	Mirror of VDP register 5 (Basic: VDP(5))
RG6SAV	#F3E5	1	Mirror of VDP register 6 (Basic: VDP(6))
RG7SAV	#F3E6	1	Mirror of VDP register 7 (Basic: VDP(7))
STATFL	#F3E7	1	Mirror of VDP(8) status register (S#0)
TRGFLG	#F3E8	1	Information about trigger buttons and space bar state `7 6 5 4 3 2 1 0` Space bar, trig(0) (0 = pressed) Stick 1, Trigger 1 (0 = pressed) Stick 1, Trigger 2 (0 = pressed) Stick 2, Trigger 1 (0 = pressed) Stick 2, Trigger 2 (0 = pressed)
FORCLR	#F3E9	1	Foreground color
BAKCLR	#F3EA	1	Background color
BDRCLR	#F3EB	1	Border color
MAXUPD	#F3EC	3	Jump instruction used by Basic LINE command. The routines used are: RIGHTC, LEFTC, UPC and DOWNC
MINUPD	#F3EF	3	Jump instruction used by Basic LINE command. The routines used are: RIGHTC, LEFTC, UPC and DOWNC
ATRBYT	#F3F2	1	Attribute byte (for graphical routines it's used to read the color)
QUEUES	#F3F3	2	Queue table address, see QUETAB (initial value).
FRCNEW	#F3F5	1	CLOAD flag =0 when CLOAD =255 when CLOAD?
SCNCNT	#F3F6	1	Key scan timing When it's zero, the key scan routine will scan for pressed keys so characters can be written to the keyboard buffer
REPCNT	#F3F7	1	This is the key repeat delay counter When it reaches zero, the key will repeat
PUTPNT	#F3F8	2	Address in the keyboard buffer where a character will be written
GETPNT	#F3FA	2	Address in the keyboard buffer where the next character is read
CS120	#F3FC	5	Cassette I/O parameters to use for 1200 baud
CS240	#F401	5	Cassette I/O parameters to use for 2400 baud
LOW	#F406	2	Signal delay when writing a 0 to tape
HIGH	#F408	2	Signal delay when writing a 1 to tape
HEADER	#F40A	1	Delay of tape header (sync.) block
ASPCT1	#F40B	2	Horizontal / Vertical aspect for CIRCLE command
ASPCT2	#F40D	2	Horizontal / Vertical aspect for CIRCLE command
ENDPRG	#F40F	5	Pointer for the RESUME NEXT command
ERRFLG	#F414	1	Basic Error code
LPTPOS	#F415	1	Printer head position Is read by Basic function LPOS and used by LPRINT Basic command
PRTFLG	#F416	1	Printer output flag is read by OUTDO =0 to print to screen =1 to print to printer
NTMSXP	#F417	1	Printer type is read by OUTDO. SCREEN ,,,n writes to this address =0 for MSX printer =1 for non-MSX printer
RAWPRT	#F418	1	Raw printer output is read by OUTDO =0 to convert tabs and unknown characters to spaces and remove graphical headers =1 to send data just like it gets it
VLZADR	#F419	2	Address of data that is temporarilly replaced by 'O' when Basic function VAL("") is running

Name	Address	Size	Description
VLZDAT	#F41B	1	Original value that was in the address pointed to with VLZADR
CURLIN	#F41C	2	Line number the Basic interpreter is working on, in direct mode it will be filled with #FFFF
QUETAB	#F959	24	Queue-table containing queue information. There are four queues in total, three PLAY queues and one RS232 queue, with 6-byte information blocks per queue:

0	Queue head offset (for writing).
1	Queue tail offset (for reading).
2	Flag indicating whether a byte has been returned.
3	Queue size.
4-5	Queue start address.

Name	Address	Size	Description
	#F91F	1	Character set SlotID
	#F920	2	Character set address
EXBRSA	#FAF8	1	SUBROM slot address (EXtended Bios-Rom Slot Address)
XSAVE	#FAFE	1	Light pen X coordinate read from the device (internal use only).
XOFFS	#FAFF	1	Light pen X calibration offset • Bit 0-6: X calibration offset • Bit 7: A light pen interrupt occurred. Used internally by the MSX-BIOS, user software mustn't set it.
YSAVE	#FB00	1	Light pen Y coordinate read from the device (internal use only).
YOFFS	#FB01	1	Light pen Y calibration offset • Bit 0-6: Y calibration offset • Bit 7: Reserved for future use. Mask from reads and do not set.
DRVINF	#FB21	1	Nr. of drives connected to disk interface 1
	#FB22	1	Slot address of disk interface 1
	#FB23	1	Nr. of drives connected to disk interface 2
	#FB24	1	Slot address of disk interface 2
	#FB25	1	Nr. of drives connected to disk interface 3
	#FB26	1	Slot address of disk interface 3
	#FB27	1	Nr. of drives connected to disk interface 4
	#FB28	1	Slot address of disk interface 4
EXPTBL	#FCC1	1	Slot 0: #80 = expanded, 0 = not expanded. Also main BIOS-ROM slot address.
	#FCC2	1	Slot 1: #80 = expanded, 0 = not expanded.
	#FCC3	1	Slot 2: #80 = expanded, 0 = not expanded.
	#FCC4	1	Slot 3: #80 = expanded, 0 = not expanded.
SLTTBL	#FCC5	1	Mirror of slot 0 secondary slot selection register.
	#FCC6	1	Mirror of slot 1 secondary slot selection register.
	#FCC7	1	Mirror of slot 2 secondary slot selection register.
	#FCC8	1	Mirror of slot 3 secondary slot selection register.
RG8SAV	#FFE7	1	Mirror of VDP register 8 (Basic: VDP(9), note: +1)
RG9SAV	#FFE8	1	Mirror of VDP register 9 (Basic: VDP(10), note: +1)
RG10SA	#FFE9	1	Mirror of VDP register 10 (Basic: VDP(11), note: +1)
RG11SA	#FFEA	1	Mirror of VDP register 11 (Basic: VDP(12), note: +1)
RG12SA	#FFEB	1	Mirror of VDP register 12 (Basic: VDP(13), note: +1)
RG13SA	#FFEC	1	Mirror of VDP register 13 (Basic: VDP(14), note: +1)
RG14SA	#FFED	1	Mirror of VDP register 14 (Basic: VDP(15), note: +1)
RG15SA	#FFEE	1	Mirror of VDP register 15 (Basic: VDP(16), note: +1)
RG16SA	#FFEF	1	Mirror of VDP register 16 (Basic: VDP(17), note: +1)
RG17SA	#FFF0	1	Mirror of VDP register 17 (Basic: VDP(18), note: +1)
RG18SA	#FFF1	1	Mirror of VDP register 18 (Basic: VDP(19), note: +1)
RG19SA	#FFF2	1	Mirror of VDP register 19 (Basic: VDP(20), note: +1)

RG20SA	#FFF3	1	Mirror of VDP register 20 (Basic: VDP(21), note: +1)
RG21SA	#FFF4	1	Mirror of VDP register 21 (Basic: VDP(22), note: +1)
RG22SA	#FFF5	1	Mirror of VDP register 22 (Basic: VDP(23), note: +1)
RG23SA	#FFF6	1	Mirror of VDP register 23 (Basic: VDP(24), note: +1)
ROMSLT	#FFF7	1	Main BIOS slot ID. (MSX2 and up only)
RG25SA	#FFFA	1	Mirror of VDP register 25 (Basic: VDP(26), note: +1)
RG26SA	#FFFB	1	Mirror of VDP register 26 (Basic: VDP(27), note: +1)
RG27SA	#FFFC	1	Mirror of VDP register 27 (Basic: VDP(28), note: +1)
	#FFFD	2	Temporary stack pointer for CHGCPU.
	#FFFF	1	Secondary slot select register, if the slot is expanded.

Secondary slot select register, if the slot is expanded.

```
7 6 5 4 3 2 1 0
| | | | | | | └─┴── Secondary slot for page 0 (#0000-#3FFF)
| | | | | └──────── Secondary slot for page 1 (#4000-#7FFF)
| | | └──────────── Secondary slot for page 2 (#8000-#BFFF)
| └──────────────── Secondary slot for page 3 (#C000-#FFFF)
```

Reading returns the inverse of the current subslot selection. Values are mirrored in SLTTBL for convenience.

Note that each expanded primary slot has its own register. To access a specific primary slot's register, you need to select it in page 3 before reading the value.

— BiFi