

\$40	(read_n / write)	ID \$08	MSX2+ FS-A1 Series	Z80B 5.37MHz			
		ID \$D4	MSX++ 1chipMSX, Zemmix Neo, etc.	OCM-PLD v2.4 or later			
\$41	(read_n / write)	BIT 0	Smart Command ID	CPL or \$FF (Null)			
		BIT 1					
		BIT 2					
		BIT 3					
		BIT 4					
		BIT 5					
		BIT 6					
\$42	(read / write_n)	BIT 7					
		BIT 0	CPU Clock	Virtual DIP-SW1			
		BIT 1	Video Output (MSB)	Virtual DIP-SW2			
		BIT 2	Video Output (LSB)	Virtual DIP-SW3			
		BIT 3	Cartridge Slot-1	Virtual DIP-SW4			
		BIT 4	Cartridge Slot-2 (MSB)	Virtual DIP-SW5			
		BIT 5	Cartridge Slot-2 (LSB)	Virtual DIP-SW6			
\$43	(read / write_n)	BIT 6	Current Mapper Size	Virtual DIP-SW7			
		BIT 7	Current MegaSD Mode	Virtual DIP-SW8			
		BIT 0	Lock Mask of the Toggles	CPU Clock			
		BIT 1		Video Output			
		BIT 2		Audio Mixer & SCRLK			
		BIT 3		Cartridge Slot-1			
		BIT 4		Cartridge Slot-2			
BIT 5	Hard Reset Key						
BIT 6	Internal Mapper						
\$44	(read / write_n)	BIT 7		Internal MegaSD			
		BIT 0	Led 1 Status				
		BIT 1	Led 2 Status				
		BIT 2	Led 3 Status				
		BIT 3	Led 4 Status				
		BIT 4	Led 5 Status				
		BIT 5	Led 6 Status				
\$45	(read / write_n)	BIT 6	Lights I/O (SM-X and SX-2 only use Led 8 but this register works the same way)	Led 7 Status			
		BIT 7		Led 8 Status			
		BIT 0		BIT 0 (LSB)			
		BIT 1		BIT 1			
		BIT 2		BIT 2 (MSB)			
		\$46		(read / write_n)	BIT 3	PSG Mute	Status
					BIT 4	Master Volume Level	BIT 0 (LSB)
BIT 5	BIT 1						
BIT 6	BIT 2 (MSB)						
BIT 7	Master Mute		Status				
\$47	(read / write_n)		BIT 0		OPLL Volume Level	BIT 0 (LSB)	
			BIT 1		OPLL Mute	BIT 1	
		BIT 2	SCC-I Volume Level	BIT 2 (MSB)			
		BIT 3		BIT 0 (LSB)			
		BIT 4		BIT 1			
		\$48	(read only)	BIT 5	SCC-I Mute	BIT 2 (MSB)	
				BIT 6	Status		
BIT 7	CPU Custom Speed Level			Status			
BIT 0				BIT 0 (LSB)			
BIT 1				BIT 1			
\$49				(read only)	BIT 2	BIT 2 (MSB)	
					BIT 3	Status	
		BIT 4	Status				
		BIT 5	0=Normal, 1=Fast				
		BIT 6	0=2048kB, 1=4096kB				
		BIT 7	MegaSD Mode Req		Status		
		\$4A	(read only)		BIT 0	Turbo Pana	Status
BIT 1				Current Keyboard Layout	0=JP, 1=Non-JP		
BIT 2				SCRLK Toggle	Status		
BIT 3				Lights Mode	0=Auto, 1=ON		
BIT 4				Red Mode (Led 0)	Status		
BIT 5				Last Reset Flag	0=Cold, 1=Warm		
BIT 6				Reset Required Flag	Status		
\$4B		(read only)	BIT 7	MegaSD Blink	Status		
	BIT 0		Pseudo Stereo	Status			
	BIT 1		External Clock Mode	0=Sync to CPU, 1=3.58MHz			
	BIT 2		Machine Type ID	BIT 0 (LSB)			
	BIT 3		(0=1chipMSX, 1=Zemmix Neo/SX-1 and related, 2=SM-X/MC2P, 3=SX-2, 4=SM-X Mini/SMX-HB, 5=DEDCV, 6-14=Free, 15=Unknown)	BIT 1			
	BIT 4		NTSC/PAL Type	BIT 3 (MSB)			
	BIT 5		Forced Video Mode	0=Forced, 1=Auto			
\$4C	(read only)	BIT 6	Right Inverse Audio	0=60Hz (NTSC), 1=50Hz (PAL)			
		BIT 7	Pixel Ratio 1:1 for LED Display	Status			
		BIT 0	Centering YJK Modes/R25 Mask	BIT 0 (LSB)			
		\$4D	(read only)	BIT 1	Assignment of Legacy Output	BIT 1	
				BIT 2	Internal Slot-1 Linear	BIT 2 (MSB)	
				BIT 3	Internal Slot-2 Linear	Status	
				BIT 4	VGA Scanlines Level (ID*25%)	0=To VGA, 1=To VGA+	
BIT 5	Internal PSG2			Status			
BIT 6	SDRAM Size			BIT 1 (MSB)			
BIT 7	(0=8MB, 1=16MB, 2=32MB, 3=reserved)			Status			
\$4E	(read only)	BIT 0	OCM-BIOS Reloading Req	Status			
		BIT 1	Extra-Mapper 4096kB Req	0=Primary, 1=Expanded			
		BIT 2	Slot-0 Mode Req	BIT 0 (LSB)			
		\$4F	(read only)	BIT 3	Free	BIT 1	
				BIT 4		BIT 2	
				BIT 5		BIT 3	
				BIT 6		BIT 4	
BIT 7	BIT 5						
BIT 0	BIT 6						
BIT 1	BIT 7 (MSB)						
\$4C	(read only)	BIT 2	CPU Clock	Hard DIP-SW1			
		BIT 3	Video Output (MSB)	Hard DIP-SW2			
		BIT 4	Video Output (LSB)	Hard DIP-SW3			
		BIT 5	Cartridge Slot-1	Hard DIP-SW4			
		BIT 6	Cartridge Slot-2 (MSB)	Hard DIP-SW5			
		BIT 7	Cartridge Slot-2 (LSB)	Hard DIP-SW6			
		BIT 0	Internal Mapper	Hard DIP-SW7			
\$4D	(read / write_n)	BIT 1	Internal MegaSD	Hard DIP-SW8			
		BIT 2	BIT 0 (LSB)				
		BIT 3	BIT 1				
		BIT 4	BIT 2				
		\$4E	(read only)	BIT 5	BIT 3 (MSB)		
				BIT 6	BIT 0 (LSB)		
				BIT 7	BIT 1		
\$4F	(read only)			BIT 0	BIT 2		
				BIT 1	BIT 3		
				BIT 2	BIT 4		
				BIT 3	BIT 5		
		BIT 4	BIT 6				
		BIT 5	BIT 7 (MSB)				
		\$4C	(read only)	BIT 6	OCM-PLD main version X.Y{.z} (range 0.0.z - 25.5.z)	BIT 0 (LSB)	
BIT 7	BIT 1						
BIT 0	BIT 2						
BIT 1	BIT 3						
BIT 2	BIT 4						
BIT 3	BIT 5						
BIT 4	BIT 6						
\$4D	(read / write_n)	BIT 5	BIT 7 (MSB)				
		BIT 6	BIT 0 (LSB)				
		BIT 7	BIT 1				
		\$4E	(read only)	BIT 0	BIT 2		
				BIT 1	BIT 3		
				BIT 2	BIT 4		
				BIT 3	BIT 5		
BIT 4	BIT 6						
BIT 5	BIT 7 (MSB)						
\$4F	(read only)			BIT 6	OCM-PLD sub version (x.y).Z (range x.y.0 - x.y.3)	BIT 0 (LSB)	
		BIT 7	Default Keyboard Layout	BIT 1 (MSB)			
		BIT 0	Status				
		Reserved to IPL-ROM					
		\$4C	(write only)	BIT 0 - 7	VDP ID Selector	0-1=ID0 (V9938), 2-255=ID2 (V9958)	
		\$4E	(write_n only)	BIT 0 - 6	-	-	
		\$4F	(write_n only)	BIT 7	JIS2 Enabler	0=JIS1+JIS2, 1=JIS1 only	
BIT 0 - 6	-			-			
\$4F	(write_n only)	BIT 7	F4 Device Mode	0=Normal, 1=Inverted			
		BIT 0 - 6	-	-			

SMART COMMANDS TABLE					
\$00	(000)			Null Command (reserved)	
\$01	(001)			Set Turbo Pana Redirection OFF (default)	
\$02	(002)			Set Turbo Pana Redirection ON	
\$03	(003)			Set Standard Speed 3.58MHz	
\$04	(004)			Set Custom Speed 4.10MHz	
\$05	(005)			Set Custom Speed 4.48MHz	
\$06	(006)			Set Custom Speed 4.90MHz	
\$07	(007)			Set Custom Speed 5.39MHz	
\$08	(008)			Set Custom Speed 6.10MHz	
\$09	(009)			Set Custom Speed 6.96MHz	
\$0A	(010)			Set Custom Speed 8.06MHz (aka "Turbo 10MHz") (default)	
\$0B	(011)			Set Turbo MegaSD OFF	
\$0C	(012)			Set Turbo MegaSD ON (default)	
\$0D	(013)			Set External Slot-1 + External Slot-2	
\$0E	(014)			Set Internal SCC-I Slot-1 + External Slot-2	
\$0F	(015)			Set External Slot-1 + Internal SCC-I Slot-2	
\$10	(016)			Set Internal SCC-I Slot-1 + Internal SCC-I Slot-2	
\$11	(017)			Set External Slot-1 + Internal ASCII-8K Slot-2	
\$12	(018)			Set Internal SCC-I Slot-1 + Internal ASCII-8K Slot-2	
\$13	(019)			Set External Slot-1 + Internal ASCII-16K Slot-2	
\$14	(020)			Set Internal SCC-I Slot-1 + Internal ASCII-16K Slot-2	
\$15	(021)			Set Japanese Keyboard Layout	
\$16	(022)			Set Non-Japanese Keyboard Layout	
\$17	(023)			Set Display Mode 15KHz Composite/S-Video	
\$18	(024)			Set Display Mode 15KHz RGB w/ Audio Out	
\$19	(025)			Set Display Mode 31KHz VGA for LED TV or LED Display	also HDMI AV on SM-X
\$1A	(026)			Set Display Mode 31KHz VGA+ for CRT Monitor (legacy output)	also HDMI AV on SM-X
\$1B	(027)			Set VDP Speed Normal Mode (default)	
\$1C	(028)			Set VDP Speed Fast Mode (V9958 only)	
\$1D	(029)			Reserve MegaSD OFF (warm reset to go)	
\$1E	(030)			Reserve MegaSD ON (warm reset to go)	
\$1F	(031)			Set MegaSD Blink OFF	
\$20	(032)			Set MegaSD Blink ON (default)	
\$21	(033)			Set Lights Mode OFF w/ Auto LEDs Control (default)	
\$22	(034)			Set Lights Mode ON + Red Led OFF	
\$23	(035)			Set Lights Mode ON + Red Led ON	
\$24	(036)			Internal Audio Preset #1 "Mute Sound"	
\$25	(037)			Internal Audio Preset #2 "Middle Sound"	
\$26	(038)			Internal Audio Preset #3 "High Sound" (default)	
\$27	(039)			Set CMT OFF (default) [disabled w/ MSXtr BIOS]	n/a on SM-X / SX-2
\$28	(040)			Set CMT ON (needs a cassette recorder) [disabled w/ MSXtr BIOS]	n/a on SM-X / SX-2
\$29	(041)			Lock Turbo Toggles	
\$2A	(042)			Unlock Turbo Toggles	
\$2B	(043)			Lock Display Toggles	
\$2C	(044)			Unlock Display Toggles	
\$2D	(045)			Lock Audio Mixer & SCRLK Toggles	
\$2E	(046)			Unlock Audio Mixer & SCRLK Toggles	
\$2F	(047)			Lock Slot-1 Toggles	
\$30	(048)			Unlock Slot-1 Toggles	
\$31	(049)			Lock Slot-2 Toggles	
\$32	(050)			Unlock Slot-2 Toggles	
\$33	(051)			Lock Slot-1 & Slot-2 Toggles	
\$34	(052)			Unlock Slot-1 & Slot-2 Toggles	
\$35	(053)			Lock Hard Reset Key	
\$36	(054)			Unlock Hard Reset Key	
\$37	(055)			Lock Mapper Toggle	
\$38	(056)			Unlock Mapper Toggle	
\$39	(057)			Lock MegaSD Toggle	
\$3A	(058)			Unlock MegaSD Toggle	
\$3B	(059)			Lock All Toggles	
\$3C	(060)			Unlock All Toggles (default)	
\$3D	(061)			Set Pseudo-Stereo OFF (default)	
\$3E	(062)			Set Pseudo-Stereo ON (needs an external sound cartridge)	
\$3F	(063)			Sync External Bus Clock to CPU Speed (default)	
\$40	(064)			Set External Bus Clock 3.58MHz	
\$41	(065)			Set Turbo Pana 5.37MHz	
\$42	(066)			Set Right Inverse Audio OFF (default)	
\$43	(067)			Set Right Inverse Audio ON	
\$44	(068)			Internal Audio Preset #4 "Emphasis PSG Sound"	
\$45	(069)			Internal Audio Preset #5 "Emphasis SCC-I Sound"	
\$46	(070)			Internal Audio Preset #6 "Emphasis OPLL Sound"	
\$47	(071)			Vertical Offset 16 (useful for Ark-A-Noah)	
\$48	(072)			Vertical Offset 17	
\$49	(073)			Vertical Offset 18	
\$4A	(074)			Vertical Offset 19 (default)	
\$4B	(075)			Vertical Offset 20	
\$4C	(076)			Vertical Offset 21	
\$4D	(077)			Vertical Offset 22	
\$4E	(078)			Vertical Offset 23	
\$4F	(079)			Vertical Offset 24 (useful for Space Manbow)	
\$50 .. \$53	(080 .. 083)			Set VGA Scanlines 0% .. 25% .. 50% .. 75% (default is 0%)	only for SM-X / SX-2
\$54	(084)			Internal PSG2 OFF (default)	only for SM-X / SX-2
\$55	(085)			Internal PSG2 ON (this second PSG acts as an external PSG)	only for SM-X / SX-2
\$56	(086)			Set Extra-Mapper 4096 kB OFF (default)	
\$57	(087)			Set Extra-Mapper 4096 kB ON (only available if SDRAM > 8MB)	
...	
\$7F	(127)			Pixel Ratio 1:1 for LED Display (default is 0) (range 0-7) (60Hz only)	
\$80	(128)			Null Command (useful for programming)	
\$81	(129)			Assign Legacy Output to VGA	
\$82	(130)			Assign Legacy Output to VGA+ (default)	
\$83	(131)			Set Internal Slot-1 Linear OFF (default)	
\$84	(132)			Set Internal Slot-1 Linear ON (requires SCC-I preset)	
\$85	(133)			Set Internal Slot-2 Linear OFF (default)	
\$86	(134)			Set Internal Slot-2 Linear ON (requires SCC-I or ASCII-8K/16K preset)	
\$87	(135)			Set Internal OPL3 OFF .. ON (default)	only for SM-X / SX-2
\$88	(136)			Set Internal OPL3 ON	only for SM-X / SX-2
\$89 .. \$8F	(137 .. 143)			Reserved (Ducasp)	only for SM-X / SX-2
...	
\$B0 .. \$B7	(176 .. 183)			Set Master Volume 0 .. 7 (default level is 7)	
\$B8 .. \$BF	(184 .. 191)			Set PSG Volume 0 .. 7 (default level is 4)	
\$C0 .. \$C7	(192 .. 199)			Set SCC-I Volume 0 .. 7 (default level is 4)	
\$C8 .. \$CF	(200 .. 207)			Set OPLL Volume 0 .. 7 (default level is 4)	
\$D0	(208)			Force NTSC Mode	
\$D1	(209)			Standard NTSC/PAL Mode (bound by Control Register 9) (default)	
\$D2	(210)			Force PAL Mode	
\$D3	(211)			Restore Default Keyboard Layout	
\$D4	(212)			Null Command (reserved)	
\$D5	(213)			Restore Default Turbo Mode	
\$D6	(214)			Set Centering YJK Modes/R25 Mask OFF (default)	
\$D7	(215)			Set Centering YJK Modes/R25 Mask ON	
\$F8	(248)			Reserve OCM-BIOS Reloading (cold reset or warm reset to go)	
\$F9	(249)			Reserve Slot-0 Primary Mode (warm reset to go) (internal OPLL disabled)	
\$FA	(250)			Reserve System Logo ON (warm reset only)	
\$FB	(251)			Cold Reset	
\$FC	(252)			Warm Reset w/ Mapper 2048kB (RAM size 6144kB if Extra-Mapper is ON)	
\$FD	(253)			Warm Reset	
\$FE	(254)			Warm Reset w/ Mapper 4096kB (RAM size 8192kB if Extra-Mapper is ON)	
\$FF	(255)			Restore All Default + Reserve Default Mapper & MegaSD	
More info on Switched I/O ports at MSX Assembly Page! < http://map.grauw.nl/resources/msx_io_ports.php#switch_io >					
R/W Logic	Positive	0 = OFF 1 = ON	(read / write)		
	Negative	0 = ON 1 = OFF	(read_n / write_n)		
Toggles	CPU Clock	[F12] or [DIP-SW1]			
	Video Output	[(SHIFT+)+PRTSR] or [DIP-SW2/3]			
	Audio Mixer & SCRLK	[(SHIFT+)+PGUP/PGDOWN/F9/F10/F11] & [SCRLK]			
	Cartridge Slot-1	[SHIFT+F12] or [DIP-SW4]			
	Cartridge Slot-2	[SHIFT+SCRLK] or [DIP-SW5/6]			
	System Reset	[HARD RESET KEY] Fast or Long-Click (normal or full reboot)			
Internal Mapper	[DIP-SW7] only				
Internal MegaSD	[DIP-SW8] only				