\$40	( read_n / write )	ID \$08 ID \$D4	MSX2+ FS-A1 Series MSX++ Computers and Compatibles	Z80B 5.37MHz OCM-PLD v2.4 or later		SMART COMMANDS TABLE		
		BIT 0 BIT 1			\$00 \$01	(000) (001)	Null Command \$00 (reserved) Set Turbo Pana Redirection OFF (default)	
\$41	( read_n / write )	BIT 2 BIT 3		A 6: III	\$02 \$03	(002)	Set Turbo Pana Redirection ON Set Standard Speed 3.58MHz	
		BIT 4 BIT 5	Smart Command ID	CPL or \$FF (Null)	\$04 \$05	(004)	Set Custom Speed 4.10MHz Set Custom Speed 4.48MHz	
		BIT 6 BIT 7			\$06 \$07	(006)	Set Custom Speed 4.90MHz Set Custom Speed 5.39MHz	
¢42	( read / write_n )	BIT 0 BIT 1	CPU Clock Video Output (MSB)	Virtual DIP-SW1 Virtual DIP-SW2	\$08 \$09	(008)	Set Custom Speed 6.10MHz Set Custom Speed 6.96MHz	
		BIT 2 BIT 3	Video Output (ISB)  Cartridge Slot-1	Virtual DIP-SW3 Virtual DIP-SW4	\$0A \$0B	(010)	Set Custom Speed 8.06MHz (aka "Turbo 10MHz") (default) Set Turbo MegaSD OFF	
\$42		BIT 4 BIT 5	Cartridge Slot-2 (MSB) Cartridge Slot-2 (LSB)	Virtual DIP-SW5 Virtual DIP-SW6	\$0C \$0D	(012)	Set Turbo MegaSD ON (default) Set External Slot-1 + External Slot-2	
		BIT 6 BIT 7	Current Mapper Size Current MegaSD Mode	Virtual DIP-SW7 Virtual DIP-SW8	\$0E \$0F	(014)	Set Internal SCC-I Slot-1 + External Slot-2 Set External Slot-1 + Internal SCC-I Slot-2	
	( read / write_n )	BIT 0 BIT 1	current wegasb wode	CPU Clock Video Output	\$10 \$11	(016) (017)	Set Internal SCC-I Slot-1 + Internal SCC-I Slot-2 Set External Slot-1 + Internal ASCII-8K Slot-2	
		BIT 2		Audio Mixer & SCRLK Cartridge Slot-1	\$12	(018)	Set Internal SCC-I Slot-1 + Internal ASCII-8K Slot-2 Set External Slot-1 + Internal ASCII-16K Slot-2 Set External Slot-1 + Internal ASCII-16K Slot-2	
\$43		BIT 3 BIT 4 BIT 5	Lock Mask of the Toggles	Cartridge Slot-2	\$13 \$14 \$15	(019) (020) (021)	Set Internal SCC-I Slot-1 + Internal ASCII-16K Slot-2 Set Japanese Keyboard Layout	
		BIT 6 BIT 7		Hard Reset Key Internal Mapper Internal MegaSD	\$15 \$16 \$17	(021)	Set Non-Japanese Keyboard Layout Set Display Mode 15KHz Composite/S-Video	
		BIT 0		Led 1 Status	\$18	( 024 )	Set Display Mode 15KHz RGB w/ Audio Out	
		BIT 1 BIT 2 BIT 3	Lights I/O	Led 2 Status Led 3 Status	\$19 \$1A \$1B	( 025 ) ( 026 )	Set Display Mode 31Khz VGA for LED TV or LED Display also HDMI AV on SM-X Set Display Mode 31Khz VGA+ for CRT Monitor (legacy output) also HDMI AV on SM-X Set VDP Speed Normal Mode (default)	
\$44	( read / write_n )	BIT 3 BIT 4 BIT 5	(SM-X, SX-2 and SX-E only use Led 8 but this register works the same way)	Led 4 Status Led 5 Status Led 6 Status	\$1C \$1D	( 027 ) ( 028 ) ( 029 )	Set VDP Speed Fast Mode (V9958 only) Reserve MegaSD OFF (warm reset to go)	
		BIT 6 BIT 7	but this register works the same way)	Led 7 Status Led 8 Status	\$1E \$1F	(030)	Reserve MegaSD ON (warm reset to go) Set MegaSD Blink OFF	
\$45	( read / write_n )	BIT 0	PSG Volume Level	BIT 0 (LSB)	\$20 \$21	( 032 )	Set MegaSD Blink ON (default) Set Lights Mode OFF w/ Auto LEDs Control (default)	
		BIT 1 BIT 2 BIT 3	PSG Mute	BIT 1 BIT 2 (MSB) Status	\$22 \$23	( 033 ) ( 034 ) ( 035 )	Set Lights Mode ON + Red Led OFF Set Lights Mode ON + Red Led OFF Set Lights Mode ON + Red Led ON	
	( read only )	BIT 4		BIT 0 (LSB)	\$24	(036)	Internal Audio Preset #1 "Mute Sound" Internal Audio Preset #2 "Middle Sound"	
	( read / write_n ) ( read only )	BIT 5 BIT 6 BIT 7	Master Volume Level  Master Mute	BIT 1 BIT 2 (MSB) Status	\$25 \$26 \$27	(037) (038) (039)	Internal Audio Preset #3 "High Sound" (default) Set CMT OFF (default) (disabled w/ MSXR BIOS)  n/a on SM-X / SX-2 / SX-E	
	( read only )	BIT 0	OPLL Volume Level	BIT 0 (LSB)	\$28	(040)	Set CMT ON (needs a cassette recorder) (disabled w/ MSXtR BIOS) n/a on SM-X / SX-2 / SX-E	
\$46		BIT 1 BIT 2		BIT 1 BIT 2 (MSB)	\$29 \$2A	(041) (042)	Lock Turbo Toggles Unlock Turbo Toggles Lock Diebar Tongles	
	( read only ) ( read / write_n )	BIT 3 BIT 4	OPLL Mute  SCC-I Volume Level	Status BIT 0 (LSB)	\$2B \$2C	( 043 ) ( 044 )	Lock Display Toggles Unlock Display Toggles Lock Audio Mixer & SCRLK Toggles	
		BIT 5 BIT 6 BIT 7		BIT 1 BIT 2 (MSB) Status	\$2D \$2E \$2E	( 045 ) ( 046 )	LOCK AUDIO MIXER & SCRLK TOggles Unlock Audio Mixer & SCRLK Toggles Lock Slot-1 Toggles	
	( read only )	BIT 0	SCC-I Mute	Status BIT 0 (LSB)	\$2F \$30	(047)	Unlock Slot-1 Toggles	
\$47		BIT 1 BIT 2	CPU Custom Speed Level	BIT 1 BIT 2 (MSB)	\$31 \$32	(049)	Lock Slot-2 Toggles Unlock Slot-2 Toggles	
	( read only )	BIT 3	Turbo MegaSD (tMSD) Turbo Pana Redirection (tPR)	Status Status	\$33 \$34	(051)	Lock Slot-1 & Slot-2 Toggles Unlock Slot-1 & Slot-2 Toggles	
		BIT 5	VDP Speed Mode Mapper Size Req	0=Normal, 1=Fast 0=2048 KB, 1=4096 KB	\$35 \$36	(053)	Lock Hard Reset Key Unlock Hard Reset Key	
		BIT 7	MegaSD Mode Req Turbo Pana	Status Status	\$37 \$38	( 055 )	Lock Mapper Toggle Unlock Mapper Toggle	
\$48	( read only )	BIT 1 BIT 2	Current Keyboard Layout SCRLK Toggle	0=JP, 1=Non-JP Status	\$39 \$3A	( 057 ) ( 058 )	Lock MegaSD Toggle Unlock MegaSD Toggle	
		BIT 3	Lights Mode Red Mode (Led 0)	0=Auto, 1=ON Status	\$3B \$3C	(059)	Lock All Toggles Unlock All Toggles (default)	
		BIT 5	Last Reset Flag Reset Required Flag	0=Cold, 1=Warm Status	\$3D \$3E	( 061 ) ( 062 )	Set Pseudo-Stereo OFF (default) Set Pseudo-Stereo ON (needs an external sound cartridge)	
	( read only )	BIT 7	MegaSD Blink Pseudo Stereo	Status Status	\$3F \$40	(063)	Sync External Bus Clock to CPU Speed (default) Set External Bus Clock 3.58MHz	
		BIT 1 BIT 2	External Clock Mode Machine Type ID	0=Sync to CPU, 1=3.58Mhz BIT 0 (LSB)	\$41 \$42	( 065 ) ( 066 )	Set Turbo Pana 5.37MHz Set Right Inverse Audio OFF (default)	
\$49		BIT 3 BIT 4	(0=1chipMSX, 1=Zemmix Neo/SX-1 and related, 2=SM-X/MC2P, 3=SX-2, 4=SM-X Mini/SMX-HB,	BIT 2	\$43 \$44	( 067 ) ( 068 )	Set Right Inverse Audio ON Internal Audio Preset #4 "Emphasis PSG Sound"	
		BIT 5 BIT 6 BIT 7	5=DEOCV, 6=SX-E, 7-14=Free, 15=Unknown)  NTSC/PAL Type	BIT 3 (MSB) 0=Forced, 1=Auto 0=60Hz (NTSC), 1=50Hz (PAL)	\$45 \$46 \$47	(069) (070) (071)	Internal Audio Preset #5 "Emphasis SCC-I Sound" Internal Audio Preset #6 "Emphasis OPLL Sound" Vertical Offset 16 (useful for Ark-A-Noah)	
\$4A	( read only )	BIT 0	Forced Video Mode Right Inverse Audio	Status	\$48	( 072 )	Vertical Offset 17	
		BIT 1 BIT 2	Pixel Ratio 1:1 for LED Display	BIT 0 (LSB) BIT 1	\$49 \$4A	( 073 ) ( 074 )	Vertical Offset 18 Vertical Offset 19 (default)	
		BIT 3	Centering YJK Modes/R25 Mask	BIT 2 (MSB) Status	\$4B \$4C	( 075 ) ( 076 )	Vertical Offset 20 Vertical Offset 21 Vertical Offset 22	
		BIT 5 BIT 6 BIT 7	Assignment of Legacy Output Internal Slot-1 Linear Internal Slot-2 Linear	0=To VGA, 1=To VGA+ Status Status	\$4D \$4E \$4F	( 077 ) ( 078 ) ( 079 )	Vertical Offset 23 Vertical Offset 24 Vertical Offset 24 (useful for Space Manbow)	
	IN A,(\$44) : if A=\$00	BIT 0	VGA Scanlines Level (ID*25%)	BIT 0 (LSB) only for SM-X / SX-2 / SX-E	\$50 \$53	( 080 083 )	Set VGA Scanlines 0% 25% 50% 75% (default is 0%) only for SM-X / SX-2 / SX-E	
\$4B	IN A,(344) . II A-300	BIT 1 BIT 2 BIT 3	Internal PSG2 SDRAM Size	BIT 1 (MSB) only for SM-X / SX-2 / SX-E Status only for SM-X / SX-2 / SX-E BIT 0 (LSB)	\$54 \$55 \$56	( 084 ) ( 085 ) ( 086 )	Set Internal PSG2 OFF (default) only for SM-X / SX-2 / SX-E Set Extra-Mapper 4096 KB OFF (default) only for SM-X / SX-2 / SX-E	
ID \$00	( read only )	BIT 4 BIT 5	(0=8 MB, 1=16 MB, 2=32 MB, 3=Size > 32 MB) OCM-BIOS Reloading Req	BIT 0 (LSB) Status	\$57 \$58	(087)	Set Extra-Mapper 4096 KB ON (only available if SDRAM > 8 MB) Set Extended MegaROM Reading OFF (default for compatibility)	
	[dynamic port 4B]	BIT 6 BIT 7	Extra-Mapper 4096 KB Req Slot-0 Mode Req	Status 0=Primary, 1=Expanded	\$59	(089)	Set Extended MegaROM Reading ON (ASCII-8K/16K max size playable)	
	IN A,(\$44) : if A=\$01	BIT 0 BIT 1	Extended MegaROM Reading	Status	\$7F	(127)	Pixel Ratio 1:1 for LED Display (default is 0) (range 0-7) (60Hz only) Null Command \$80 (useful for programming)	
\$4B	IN A,(344) . II A-301	BIT 2 BIT 3		BIT 0 (LSB) BIT 1 BIT 2 (MSB)	\$80 \$81 \$82	(128) (129) (130)	Assign Legacy Output to VGA Assign Legacy Output to VGA+ (default)	
ID \$01	( read only )	BIT 4 BIT 5		BIT 0 (LSB) BIT 1	\$83 \$84	(131) (132)	Set Internal Slot-1 Linear OFF (default) Set Internal Slot-1 Linear ON (requires SCC-I preset)	
	[dynamic port 4B]	BIT 6 BIT 7	Vertical Offset (ID+12)	BIT 2 BIT 3 (MSB)	\$84 \$85 \$86	(132) (133) (134)	Set Internal Slot-2 Linear OFF (default) Set Internal Slot-2 Linear OFF (default) Set Internal Slot-2 Linear ON (requires SCC-I or ASCII-8K/16K preset)	
\$4C		BIT 0 BIT 1	CPU Clock Video Output (MSB)	Hard DIP-SW1 Hard DIP-SW2	\$87 \$88	(135) (136)	Set Internal OPL3 OFF (default) only for SM-X / SX-2 / SX-E Set Internal OPL3 ON only for SM-X / SX-2 / SX-E only for SM-X / SX-2 / SX-E	
	( read only )	BIT 2	Video Output (LSB)	Hard DIP-SW3	\$88 \$89 \$8F	( 136 ) ( 137 143 )	Reserved (Ducasp)  only for SM-X / SX-2 / SX-E  only for SM-X / SX-2 / SX-E	
		BIT 3 BIT 4 BIT 5	Cartridge Slot-1 Cartridge Slot-2 (MSB) Cartridge Slot-2 (LSB)	Hard DIP-SW4 Hard DIP-SW5 Hard DIP-SW6	\$B0 \$B7 \$B8 \$BF	( 176 183 ) ( 184 191 )	Set Master Volume 0 7 (default level is 7) Set PSG Volume 0 7 (default level is 4)	
		BIT 6	Internal Mapper	Hard DIP-SW7	\$C0 \$C7 \$C8 \$CF	( 192 199 ) ( 200 207 )	Set SCC-I Volume 0 7 (default level is 4) Set OPLL Volume 0 7 (default level is 4)	
\$4D	( read / write_n )	BIT 7	Internal MegaSD	Hard DIP-SW8 BIT 0 (LSB)	\$D0	( 208 )	Force NTSC Mode	
		BIT 1 BIT 2	64 KB VRAM Slot ID (Page 0)	BIT 1 BIT 2	\$D1 \$D2	( 209 ) ( 210 )	Standard NTSC/PAL Mode (bound by Control Register 9) (default) Force PAL Mode Restore Default Keyboard Layout	
		BIT 3 BIT 4 BIT 5		BIT 3 (MSB) BIT 0 (LSB) BIT 1	\$D3 \$D4 \$D5	(211) (212) (213)	RESTOTE DETAULT REVPORTE LEYOUT Null Command \$D4 (reserved) + Set C-BIOS Mode ON [Reserved to IPL-ROM] Restore Default Turbo Mode	
		BIT 5 BIT 6 BIT 7	64 KB VRAM Slot ID (Page 1)	BIT 2 BIT 3 (MSB)	\$D5 \$D6 \$D7	(214) (214) (215)	Restrict Default in this Mode Set Centering YJK Modes/R25 Mask OFF (default) Set Centering YJK Modes/R25 Mask ON	
\$4E	( read only )	BIT 0		BIT 0 (LSB)	\$F8	( 248 )	Set Centering 1st Modes/RZS Midsk ON Reserve OCM-BIOS Reloading (cold reset or warm reset to go) Reserve Slot-0 Primary Mode (warm reset to go) (internal OPLL disabled)	
		BIT 1 BIT 2	OCM BLDii	BIT 1 BIT 2	\$F9 \$FA	( 249 ) ( 250 )	Reserve System Logo ON (warm reset to go) (Internal OPLL disabled) Cold Reset	
		BIT 3 BIT 4 BIT 5	OCM-PLD main version X.Y(.z) (range 0.0.z - 25.5.z)	BIT 3 BIT 4 BIT 5	\$FB \$FC \$ED	( 251 ) ( 252 ) ( 253 )	Cold Reset W/ Mapper 2048 KB (RAM size 6144 KB if Extra-Mapper is ON) Warm Reset	
		BIT 6 BIT 7		BIT 6 BIT 7 (MSB)	\$FD \$FE \$FF	( 253 ) ( 254 ) ( 255 )	Warm Reset Warm Reset w/ Mapper 4096 KB (RAM size 8192 KB if Extra-Mapper is ON) Restore All Default + Reserve Default Mapper & MegaSD	
\$4F	( read only )	BIT 0 BIT 1 BIT 2 BIT 3 BIT 4 BIT 5	I/O Revision ID (0 - 31)  OCM-PLD sub version (x.y), Z	BIT 0 (LSB)				
				BIT 1 BIT 2 BIT 3	More in	nfo on Switched I/O	ports at MSX Assembly Page! < http://map.grauw.nl/resources/msx_io_ports.php#switch_io >	
				BIT 4 (MSB) BIT 0 (LSB)		Positive	0 = OFF ( read / write ) 1 = ON	
		BIT 6 BIT 7	(range x.y.0 - x.y.3)  Default Keyboard Layout	BIT 0 (LSB) BIT 1 (MSB) Status	R/W Logic	Negative	1 = UN 0 = ON (read_n/write_n) 1 = OFF	
		5/1 /	Reserved to IPL-ROM			CPU Cloc	ck [F12] or [DIP-SW1]	
\$4C	( write only )	BIT 0 - 7	VDP ID Selector	0-1=ID0 (V9938), 2-255=ID2 (V9958)		Video Out Audio Mixer &	SCRLK [(SHIFT+)PGUP/PGDOWN/F9/F10/F11] & [SCRLK] CMT or OPL3 depending	
\$4E	( write_n only)	BIT 0-6		-	Toggles	Cartridge SI Cartridge SI	lot-2 [SHIFT+SCRLK] or [DIP-SW5/6]	
\$4F	( write_n only)	BIT 7	JIS2 Enabler -	0=JIS1+JIS2, 1=JIS1 only - 0=Necrosid 1=Jectorists		System Re Internal Ma	pper [DIP-SW7] only	
		BIT 7	F4 Device Mode	0=Normal, 1=Inverted		Internal Me	gaSD [DIP-SW8] only	