

## INSTRUCTION FOR EMS DRIVER PREPARATION

1. After power is turned on, and before DRAM begins refreshing, an initial value needs to be written in EMS Register R0 (This writing to be done within BIOS ROM).

### Initial values

- (1) Write 9DH when I/O port address is E8H.
  - (2) Write 93H when I/O port address is 98H.
2. When data has been written in EMS Registers R0-R7, Bit 7 in R0 has to be read as a way to confirm if the Register contents have been transferred from DADR to HADA.
    - (1) When Bit 7 in R0 is 1, it means that the transfer has yet to be achieved.
    - (2) When Bit 7 in R0 is 0, it means that the transfer has been achieved.
  3. The system memory size in EMS Register shall not be set at any value larger than 640KB (A0H).
  4. The segment start address in EMS Register R3 shall not be set at any value smaller than the system memory size (R2).
  5. When setting the page Nos. of banks 0-3 in EMS Registers R4-R7, these Nos. shall correspond to these page Nos. counted, by 16KB unit, from the DRAM address 0000 : 0000H.

## Example

When EMS has a system memory size of 640KB and the usable page head is to be set:  $640 \div 16 = 40$  (28H)  
Therefore, 28H is set as the page head.

Incidentally, a physical page can be released by setting its corresponding bank at 0.

6. The banks 0-3 in EMS Registers R4-R7 are always in correspondence to physical pages 0-3.
7. When the system memory size is 1MB (as shown in the Memory Address Setting 3 in an attached Table), the setting of EMS page No. at 40H will result in production of an image from the memory's 0000 : 0000H.
8. EMS maximum page Nos. are 216 pages at 4MB. The memory size that can be used with DOS is 640KB.

## MEMORY ADDRESS

### DRAM

NO	DIP Switch setting			Memory type		Memory size	Memory Location
	S6	S7	S8	BANK1	BANK0		
0	ON	ON	ON	NONE	256Kbits	512KB	0~7FFFF
1	ON	ON	OFF	64Kbits	256Kbits	640KB	0~9FFFF
2	ON	OFF	ON	256Kbits	256Kbits	640KB+384KB	0~9FFFF 10000~15FFFF
3	ON	OFF	OFF	256Kbits	256Kbits	640KB+EMS(16KBx24pages)	0~9FFFF
4	OFF	ON	ON	NONE	1Mbits	640KB+1408KB	0~9FFFF 10000~25FFFF
5	OFF	ON	OFF	NONE	1Mbits	640KB+EMS(16KBx88pages)	0~9FFFF
6	OFF	OFF	ON	1Mbits	1Mbits	640KB+3456KB	0~9FFFF 10000~45FFFF
7	OFF	OFF	OFF	1Mbits	1Mbits	640KB+EMS(16KBx216pages)	0~9FFFF

### PROM

Memory type	ROM0, ROM2 Location address	ROM1, ROM3 Location address
128Kbits	0E0000 ~ 0E7FFF 0F0000 ~ 0F7FFF FE0000 ~ FE7FFF FF0000 ~ FF7FFF	0E8000 ~ 0EFFFF 0F8000 ~ 0FFFFF FE8000 ~ FEFFFF FF8000 ~ FFFFFF
256Kbits	0E0000 ~ 0EFFFF FE0000 ~ FEFFFF	0F0000 ~ 0FFFFF FF0000 ~ FFFFFF

## EMS INTERFACE

### EMS Port Address

EMS98/E8	Location	Description
"L"	E8H	Access to 80287 is impossible at E8 - EFH.
"R"	98H	Access to 74LS612 is impossible at 98 - 9FH.

### EMS Registers

		D7	D6	D5	D4	D3	D2	D1	D0	Description
R0	Variable port address.	T/R flag	Variable port address.							T/R flag Read 1: Transfer yet to be done 0: Transfer done Write 1: Read possible 0: Read impossible
	Transfer flag. (Read) R0 Read enable (Write)		A9	A8	A7	A6	A5	A4	A3	
R1	Reserved.									
R2	System memory size.	A19	A18	A17	A16	A15	A14	fixed 0		Read impossible (A0H:0000~9FFFFH)
R3	Segment start address.	A19	A18	A17	A16	A15	A14	fixed 0		Read impossible (C0H:segmentC000H)
R4	Bank 0	P7	P6	P5	P4	P3	P2	P1	P0	Read impossible
R5	Bank 1	P17	P16	P15	P14	P13	P12	P11	P10	Read impossible
R6	Bank 2	P27	P26	P25	P24	P23	P22	P21	P20	Read impossible
R7	Bank 3	P37	P36	P35	P34	P33	P32	P31	P30	Read impossible