8086 ADDRESSING MODES - II

2.4.5 Based Addressing with displacement

			Before	After
Ex1:	MOV DH, 2345H[BX]	DH	~~45H~~	67H
	2345H is 16-bit displacement	BX	4000H	
	4000 + 2345 = 6345H	DS:6345H	67H	

			Before	After
Ex2:	MOV AX, 45H[BP]	AX	~~1000H~~	CDABH

45H is 8-bit displacement	BP	3000H	
3000 + 45 = 3045H	SS:3045H	ABH	LS byte
It is SS when BP is used	SS:3346H	CDH	MS byte

Base register can only be BX or BP. This scheme provides 4 ways of addressing an operand in memory.

2.4.6 Indexed Addressing with displacement

			Before	After
Ex1: MOV CL, 2345H[SI]		CL	~~60H~~	85H
2345H is 16-bit displacement		SI	6000H	
6000 + 2345 = 8345H	DS:8345H		85H	

			Before	After
Ex2: MOV DX, 37H[DI]		DX	~~7000H~~	B2A2H

37H is 8-bit displacement

DI | 5000H

5000H+ 37H = 5037H

DS:5037H | A2H | LS byte

DS:5038H | B2H | MS byte

Index register can only be SI or DI. This scheme provides 4 ways of addressing an operand in memory.

2.4.7Based Indexed Addressing

		Before	After
Ex1: MOV CL, [SI][BX]	CL	~~40H~~	67H
	SI	2000H	
	BX	0300H	

2000H + 0300H = 2300H

DS:2300H | 67H

		Before	After
Ex2: MOV CX, [BP][DI]	CX	~~6000H~~	6385H

	BP	3000H	
	DI	0020H	
2000H + 0300H = 2300H	SS:3020H	85H	LS byte
It is SS when BP is used	SS:3021H	63H	MS byte

This scheme provides 4 ways of addressing an operand in memory. One register must be a Base register and the other must be an Index register.

For ex. MOV CX, [BX][BP] is an invalid instruction.

2.4.6 Based Indexed Addressing with Displacement

			Before	After
Ex1: MOV DL, 37H[BX+DI]		DL	~~40H~~	12H
37H is 8-bit displacement		BX	2000H	
		DI	0050H	

2000H + 0050H + 37H = 2300H DS:2087H | 12H |

Before After

Ex2: MOV BX, 1234H[SI+BP] BX | ~~3000H~~ | 3665H |

SI | 4000H |

BP | 0020H |

4000H + 0020H +1234 = 5254H SS:5254H | 65H | LS byte

It is SS when BP is used SS:5255H | 36H | MS byte

This scheme provides 8 ways of addressing an operand in memory.

2.4.7 Memory modes as derivatives of Based Indexed Addressing with Displacement

Instruction	Base Register	Index Register	Displacement	Addressing mode
MOV BX, DS:5634H	No	No	Yes	Direct Addressing
MOV CL, [SI]	No	Yes	No	Register Indirect
MOV DX, [BX]	Yes	No	No	
MOV DH, 2345H[BX}	Yes	No	Yes	Based Addressing with

				Displacement
MOV DX, 35H[DI]	No	Yes	Yes	Indexed Addressing with displacement
MOV CL, 37H[SI+BX]	Yes	Yes	No	Based Indexed Addressing
MOV DL, 37H[BX+DI]	Yes	Yes	Yes	Based Indexed Addressing with displacement

2.4.8 I/O port Addressing

I/O port Addressing

Fixed port addressing

Or Direct Port addressing

Variable port addressing

Or Indirect port addressing

Fixed Port Addressing

		Before	After
Ex. 1: IN AL, 83H	AL	~~34H~~	78H

Input port no. 83H | 78H

		Before	After
Ex. 2: IN AX, 83H	AX	~~5634H~~	F278H

Input port no. 83H	78H
Input port no. 84H	F2H

		Before	After
Ex. 3: OUT 83H, AL	AL	50H	

Output port no. 83H	~~65H~~	50H

		Before	After
Ex. 4: OUT 83H, AX	AX	6050H	

Output port no. 83H	~~65H~~	50H
Output port no. 84H	~~40H~~	60H

IN and OUT instructions are allowed to use only AL or AX registers. Port address in the range 00 to FFH is provided in the instruction directly.

2.4.9.Variable Port Addressing

I/O port address is provided in DX register. Port address ranges from 0000 to FFFFH. Data transfer with AL or AX only.

Ex. 1: IN AL, DX

	Before	After
AL	~~30H~~	60H
DX	1234H	

Input port no. 1234H | 60H |

Ex. 2: IN AX, DX

	Before	After
AX	~~3040H~~	7060H
DX	4000H	

Input port no. 4000H	60H
Input port no. 4001H	70H

Ex. 3: OUT DX, AL

	Before	After
AL	65H	
DX	5000H	
Output port no. 5000H	~~80H~~	65H

		Before	After
Ex. 4: OUT DX, AX	AX	4567H	
	DX	5000H	
	Output port no. 5000H	~~25H~~	67H
	Output port no. 5001H	~~36H~~	45H