

Lab Manual, Ch 1 Introduction to the Labs .....	5
Laboratory Manual, Ch 2 Data Representation .....	9
2.1 System Configurations .....	9
2.1.1 Booting Floppy Based Systems .....	9
2.1.2 Booting a Hard Disk Based System .....	9
2.1.3 Using a PC Emulator .....	10
2.2 MS-DOS Commands .....	10
2.3 Directories, Subdirectories, and Filenames .....	10
2.4 Wildcards .....	12
2.5 Useful MS-DOS Commands .....	13
2.5.1 The Change Drive Command .....	13
2.5.2 The DIR Command .....	13
2.5.3 The DEL Command .....	13
2.5.4 The Type Command .....	14
2.5.5 The RENAME Command .....	14
2.5.6 The COPY Command .....	14
2.6 Some Useful MS-DOS Extrinsic Commands .....	15
2.6.1 The PRINT Command .....	15
2.6.2 The FORMAT Command .....	15
2.6.3 A Final Note About DOS Commands .....	16
2.7 A Note about Viruses and Other Nasty Objects on the System .....	16
2.8 MS-DOS Laboratory Exercises .....	17
2.8.1 Before Coming to the Laboratory .....	17
2.8.2 Laboratory Exercise .....	17
2.9 Sample Pre-Lab Report .....	20
2.10 Sample Lab Report .....	23
2.11 Chapter Two Examples and Study Guide .....	29
2.12 Answers To Selected Questions .....	38
Laboratory Manual, Ch 3 80x86 Based Systems .....	41
3.1 Debuggers and SIM886 .....	41
3.1.1 Displaying and Entering Memory Values .....	41
3.1.2 Disassembling (Unassembling) 886 Instructions .....	42
3.1.3 Displaying CPU Registers .....	43
3.1.4 Executing 886 Instructions .....	43
3.1.5 Miscellaneous SIM886 Commands and Other Notes .....	44
3.2 Machine Language vs. Assembly Language .....	44
3.3 A Review of the 886 Instruction Set .....	45
3.4 Converting 886 Programs to Machine Code .....	47
3.4.1 Encoding the LOAD, STORE, ADD, and SUB Instructions .....	48
3.4.2 Encoding the IFEQ, IFLT, and IFGT Instructions .....	50
3.4.3 Encoding the HALT, GET, PUT, and GOTO Instructions .....	52
3.4.4 Creating Machine Language Programs .....	53
3.5 The Execution Time of an x86 Program .....	55
3.6 Using the Built-in “Mini-Assembler” .....	58
3.7 The SIM886 Laboratory Exercises .....	59
3.7.1 Before Coming to the Laboratory .....	59

3.7.2 Laboratory Exercises .....	59
3.8 Programming Projects .....	61
3.9 Answers to Selected Questions .....	62
Laboratory Manual, Ch 4 Memory Organization & .....	65
4.1 Debuggers and CodeView™ .....	65
4.1.1 A Quick Look at CodeView .....	66
4.1.1.1 The Source Window .....	67
4.1.1.2 The Memory Window .....	67
4.1.1.3 The Register Window .....	69
4.1.1.4 The 8087 Window .....	69
4.1.1.5 The Command Window .....	70
4.1.1.6 The Help Window .....	70
4.1.1.7 The Output Menu Item .....	70
4.1.1.8 Adjusting the Size of the Windows .....	70
4.1.2 The CodeView Command Window .....	70
4.1.2.1 The Radix Command (N) .....	71
4.1.2.2 The Assemble Command .....	72
4.1.2.3 The Compare Memory Command .....	73
4.1.2.4 The Dump Memory Command .....	74
4.1.2.5 The Enter Command .....	75
4.1.2.6 The Fill Memory Command .....	77
4.1.2.7 The Input Command .....	77
4.1.2.8 The Move Command .....	78
4.1.2.9 The Output Command .....	78
4.1.2.10 The Quit Command .....	78
4.1.2.11 The Register Command .....	79
4.1.2.12 The Unassemble Command .....	79
4.1.3 CodeView Function Keys .....	80
4.1.4 Some Comments on CodeView Addresses .....	80
4.1.5 A Wrap on CodeView .....	81
4.2 Segmented Addressing on the 80x86 .....	82
4.3 Normalized Addresses on the 80x86 .....	83
4.4 Memory Addressing Modes on the 80x86 .....	83
4.5 Memory Addressing Modes on the 80386 (and Later) .....	86
4.6 The 80x86 MOV Instruction .....	88
4.7 The LEA, LES, ADD, and MUL Instructions .....	91
4.8 Variables in an Assembly Language Program .....	93
4.9 Declaring Your Own Types with TYPEDEF .....	94
4.10 Pointers .....	95
4.11 Arrays in Assembly Language Programs .....	95
4.12 Multidimensional Arrays .....	98
4.13 Structures .....	98
4.14 Memory Organization Laboratory Exercises .....	100
4.14.1 Before Coming to the Laboratory .....	100
4.14.2 Laboratory Exercises .....	100
4.15 Programming Projects .....	104
Laboratory Manual, Ch 5 .....	The 80x86 Instruction Set

5.1 The 80x86 Flags Register .....	107
5.2 Data Movement Instructions .....	108
5.3 Sign/Zero Extension and Conversion Instructions .....	112
5.4 Arithmetic Instructions .....	114
5.5 Logical, Shift, Rotate, and Bit Instructions .....	119
5.6 The I/O Instructions .....	125
5.7 The String Instructions .....	126
5.8 Unconditional Jumps .....	128
5.9 The CALL and RET Instructions .....	128
5.10 The INT, INTO, BOUND, and IRET Instructions .....	128
5.11 The Conditional Jump Instructions .....	129
5.12 The JCXZ and LOOPxx Instructions .....	130
5.13 Miscellaneous Instructions .....	131
5.14 Using MASM and LINK .....	132
5.15 IBM/L (Instruction Benchmarking Language) .....	132
5.16 The 80x86 Instruction Set Laboratory Exercises .....	139
5.16.1 Before Coming to the Laboratory .....	139
5.16.2 Laboratory Exercises .....	139
5.17 Programming Projects .....	144
Laboratory Manual, Ch 6 MASM & the UCR StdLib .....	145
6.1 Assembly Language Statements .....	145
6.2 The Location Counter .....	146
6.3 Symbols .....	151
6.4 Literal Constants .....	155
6.5 Segments .....	157
6.6 Procedures .....	159
6.7 Address Expressions .....	161
6.8 Type Operators .....	164
6.9 Segment Prefixes and the ASSUME Directive .....	166
6.10 Conditional Assembly .....	168
6.11 Macros .....	171
6.12 Managing Large Programs .....	174
6.13 Project Management with MAKE/NMAKE .....	176
6.14 The UCR Standard Library .....	178
6.15 The MASM and UCR StdLib Laboratory .....	180
6.15.1 Before Coming to the Laboratory .....	180
6.15.2 Laboratory Exercises .....	181
6.16 Programming Projects .....	192
Lab Manual, Ch 7 Arithmetic and Logical Operations .....	193
7.1 Arithmetic Operations .....	193
7.2 Boolean Operations .....	200

7.3 Logical Operations .....	204
7.4 Extended Precision Operations .....	209
7.5 Logic Functions and Simulating Electronic Circuits with Software .....	210
7.6 Debugging Programs with CodeView .....	218
7.7 Debugging Strategies .....	220
7.7.1 Locating Infinite Loops .....	220
7.7.2 Incorrect Computations .....	221
7.7.3 Illegal Instructions/Infinite Loops Part II .....	222
7.8 Before Coming to the Laboratory .....	222
7.9 Laboratory Exercises .....	222
7.10 Programming Projects .....	227
<b>Lab Manual, Ch 8 Control Structures .....</b>	<b>229</b>
8.1 Decisions with the IF..THEN Statement .....	229
8.2 Decisions with the IF..THEN..ELSE Statement .....	233
8.3 CASE Statements .....	235
8.4 Loops .....	237
8.5 FOR Loops .....	241
8.6 Nested Statements .....	242
8.7 Timing Delay Loops .....	245
8.8 The 8253/8254 Timer Chip .....	248
8.8.1 The Physics of Sound .....	248
8.8.2 The Fundamentals of Music .....	249
8.8.3 The Physics of Music .....	251
8.8.4 Programming the Timer Chip to Produce Musical Tones .....	252
8.8.5 Putting it All Together .....	253
8.9 Before Coming to the Laboratory .....	254
8.10 Laboratory Exercises .....	254
8.11 Programming Projects .....	255