Experiment 2: The Motorola 68HC12 Instruction Set and the M68EVB912B32 Evaluation Board

Objectives:
Introduction to the M68EVB912B32 Evaluation Board
To learn some of the 68HC12 instructions and addressing modes
Mount a power receptacle and power LED on your board.

Reading:
CPU12 Reference Manual, Sections 2, 3, 5, App. A
M68EVB912B32 Evaluation Board Users Manual Section 3

Introduction:
The first thing you need to do is mount the power jack and LED on your board. This allows a convenient way to power your board and tell if it is getting power (the LED). Once the board is running, you will familiarize yourself with the Motorola M68EVB912B32 monitor by experimenting with the 68HC12 instruction set. You will experiment with a variety of instructions and addressing modes through several small experiments. For each experiment you will write a small code segment in assembly language, assemble it into machine language, and then execute it on the machine. For each experiment you will determine the initialization required to “test” the instruction(s) being studied. This will help you to determine useful test data and help you learn the instruction set and addressing modes available in the 68HC12. Both of these skills will be valuable as we develop more sophisticated 68HC12 programs.

Experiment:
You will write, assemble, and execute each of the instruction sequences specified. You must also initialize the memory and registers as appropriate to execute the instructions.

You must list the following for each sequence:
1. Relevant Memory before instruction(s) execute:
2. Relevant Registers before instruction(s) execute:
3. Instruction(s):
4. Machine Code:
5. Relevant Memory after instruction(s) execute:
6. Relevant Registers after instruction(s) execute:

If no memory locations are involved then write “NONE”.

For example if you were asked to test ORAA using the extended addressing mode:

1. Mem. Before: (0900) = 55
2. Reg. Before: (A) = CC, N=0, Z=1
3. Instruction: ORAA $0900
4. Machine Code: BA 09 00
5. Mem. After: (0900) = 55
6. Reg. After: (A) = DD, N=1, Z=0

Here are the exercises for you to complete:

1. LDAA instruction using immediate addressing mode
2. LDAB instruction using accumulator offset indexed addressing mode
3. LDAA instruction using indirect indexed addressing mode
4. LDAA instruction using indexed auto-post-increment by 4 addressing mode
5. MOVW instruction using immediate/extended addressing mode
6. LEAX instruction using accumulator offset indexed addressing mode
7. PSHX instruction followed by PULY instruction
8. PSHA instruction followed by PSHB instruction followed by PULD instruction
9. ADDA instruction using indexed addressing followed by DAA
10. SUBA instruction using immediate followed by DAA (what goes wrong here)?
11. EMUL instruction using inherent addressing mode
12. EMINM instruction using indexed 16-bit offset addressing mode
13. FDIV instruction using inherent addressing mode
14. LSLA instruction using inherent addressing mode
15. RORB instruction using inherent addressing mode
16. SEX instruction using the inherent addressing mode
17. CPX instruction using extended addressing mode
18. TST instruction using constant offset indexed addressing mode
19. ANDCC instruction using immediate addressing mode
20. ORCC instruction using immediate addressing mode
21. STOP instruction using the inherent addressing mode

Instructor Signature: ________________________________

(You must have this sheet signed and dated in lab after you have completed all parts, and you must include this signed sheet with your write-up).