PRELAB 1: MC68000 CPU PROGRAMMING VIA SIMULATOR
DATA TRANSFER INSTRUCTIONS

OBJECTIVES

State the objective of Lab1.

PROCEDURE

1. The exercises in this prelab must be attempted and submitted to the lab instructor before Lab1 can be conducted. The group leader has to GET APPROVAL from the lab instructor to carry out Lab1 experiments.
2. All the programs in the exercises have to be written, assembled and executed using the EASy68K simulator.

EXERCISES

1. The following program shows how data is created in data register.
   ```
   ORG $400400
   MOVE.B #$46, D0    ; write data $46 into D0
   MOVE.W #$7823, D1  ; write data $7823 into D1
   MOVE.L #$98AB73FF, D2 ; write data $98AB73FF into D2
   END
   ```
   Assemble this program, execute it and observe the results.

2. The following program shows how data is created in address register.
   ```
   ORG $400400
   MOVEA.W #$7823, A1 ; write address $7823 into A1
   MOVEA.L #$400600, A2 ; write address $400600 into A2
   END
   ```
   Assemble this program, execute it and observe the results.

3. Execute the following program and state the contents of the affected registers and the memory location. Explain the function of the program.
   ```
   ORG $400400
   MOVE.W #$9854, D0
   MOVE.W D0, $400460
   MOVE.B $400460, D4
   MOVE.W $400460, D6
   END
   ```
4. Write a program that will store $A4, $2B65 in two data registers and copy these values in memory locations $400650 and $400652 respectively.

5. Execute the following program and state the contents of the affected registers and the memory location. Explain the benefit of using this addressing mode in a program.

```assembly
ORG $400400
MOVE.W #$3846, D0
LEA $400460, A0
MOVE.W D0, (A0)
MOVE.B (A0), D2
MOVE.W (A0), D5
END
```

6. Execute the following program and explain the result of each instruction.

```assembly
ORG $400400
NUM1 EQU $69C3
NUM2 EQU $E72B
MOVE.W #NUM1, D0
MOVE.W #NUM2, D1
MOVEA.L #$400450, A0
MOVE.B (A0), D1
MOVE.W (A0), D0

ORG $400450
DC.W $B243
END
```
OBJECTIVES

State the objective of Lab2.

PROCEDURE

1. The exercises in this prelab must be attempted and submitted to the lab instructor before Lab2 can be conducted. The group leader has to GET APPROVAL from the lab instructor to carry out Lab2 experiments.
2. All the programs in the exercises have to be written, assembled and executed using the EASy68K simulator.

EXERCISES

1. Write and execute a program that adds the numbers $23, $56, $A9 and $8C together. The result must be stored in memory location $400500.

2. a) Write and execute the following program. Explain the result of each instruction.
   ORG $400400
   MOVE.W #$FF27, D2
   MOVE.W #$FE3A, D3
   SUB.W D2, D3
   END
   b) Change the instruction SUB.W to SUB.L for the program in 3 a) above, execute the program and explain the difference in the results.

3. Examine the difference between DIVU and DIVS instructions by executing a program that
   i) divides $FFFFFF88 by $00000014 using DIVS
   ii) divides $000009C4 by $000001F4 using DIVU.
   Explain on the results obtained.

4. Write, assemble and execute a program that complement the bits 1, 5, 7, 9, 11 and 15 in a data register stored with $A2BDE589, leaving all other bits unchanged.

5. a) Write and execute a program that adds the numbers $34 and $68 using
   (i) ABCD instruction.
   (ii) ADD instruction.
   Explain on the results obtained.
   b) Change the ABCD instruction for the program in 10 a) with SBCD instruction.
   Write and execute the program, explain on the results obtained.
PRELAB 3: MC68000 CPU PROGRAMMING VIA SIMULATOR
PROGRAM LOOPS AND SUBROUTINES

OBJECTIVES

State the objective of Lab3.

PROCEDURE

3. The exercises in this prelab must be attempted and submitted to the lab instructor before Lab3 can be conducted. The group leader has to GET APPROVAL from the lab instructor to carry out Lab3 experiments.
4. All the programs in the exercises have to be written, assembled and executed using the EASY68K simulator.

EXERCISES

1. Study carefully the following program. Assemble and execute it, explain on the result obtained.

```
ORG $400400
TOTAL CLR.W D0
MOVE.B #10, D1
MOVEA.L #DATA, A0
LOOP ADD.B (A0)+, D0
SUBI.B #1, D1
BNE LOOP
MOVEA.L #SUM, A1
MOVE.W D0, (A1)
SUM DC.W 0
DATA DC.B $16,$23,$45,$78,$34
DC.B $08,$60,$36,$44,$66
END
```

2. Write and execute a program that will AND 8-bit number stored in locations $400600 to $400610 and save the result in memory locations $400700.

3. Write and execute a program that will compute the area of two right angle triangles and stored the results in data registers. The side lengths of the first triangle are stored in memory locations $400500 and $500501 whereas for the second triangle, the side lengths can be found in locations $400600 and $400601. The calculation process of the area must be done in a subroutine.