Module Name: Microprocessor Systems Laboratory

Module Code: ELCE333

Laboratory Experiment No. 2

Pre-Lab Report

Experiment Title:

Development and Testing of HCS12 Programs Using Branching and Loops

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Introduction

In this pre-lab report, branching & loops in assembly language will be practiced using different mnemonics. Task 1 requires to writing a comparison instruction that compares the contents of Acc A & B, and storing the biggest value in address $1000.

"**If Acc A >Acc B, Store Acc A→[$1000] and if Acc B>Acc A; Store Acc B→ [$1000].**"

Pre-Lab Tasks:

I. Load Acc A = #$10 and Acc B = #$20. Use BGT or BLE branch instructions.

Table 1: The operations of BGT and BLE

BGT or LBGT	Branch if greater than
BLE or LBLE	Branch if less than

The instructions are below:

```
LOC1 EQU $1000

  ORG $4000

Entry:

 CLRA
 CLRB
 LDAA #$10
 LDAB #$20
 CBA
 BGT  YES ;branch if A greater than B

 STAB LOC1 ;
 BRA Exit

YES STAA LOC1

Exit  BRA Exit

HERE JMP HERE
```

Address $1000 contents is the value of B, which is greater than A. Figure 1 shows the results.

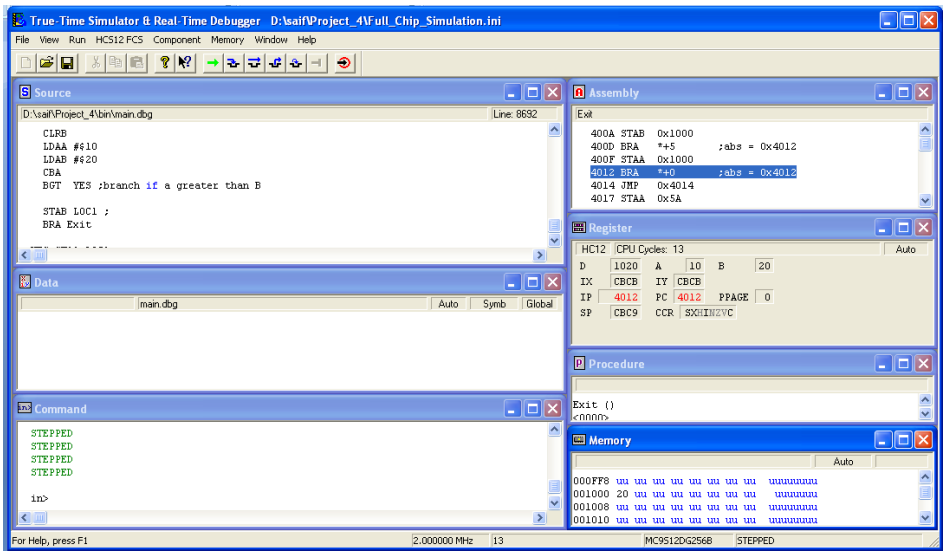

Figure 1: contents of location $1000 is 20

II. Load Acc A = #$93 and Acc B = #$56. Use BMI or BPL branch instructions.

Table 2: The operations of BMI & BPL

BMI or LBMI	Branch if minus
BPL or LBPL	Branch if plus

Instructions are as follows:

```
LOC1 EQU $1000

  ORG $4000

Entry:

 CLRA
 CLRB
 LDAA #$93
 LDAB #$56
 CBA
 BPL  YES ; if the result is positive

 STAB LOC1
 BRA Exit
YES STAA LOC1

Exit  BRA Exit
HERE JMP HERE
```

The contents of location $1000 is $93, which is the highest value (A). Figure 2 shows the results.

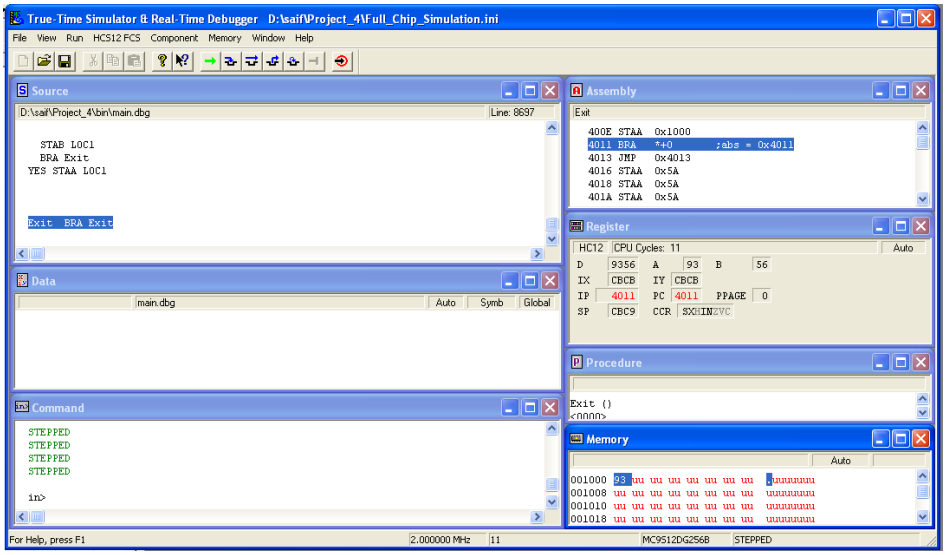

Figure 2: The contents of address $1000 is 93

III. Load Acc A = #$85 and Acc B = #$92. Use BCC or BCS branch instructions.

Table 3: The operations of BCC & BCS

BCC or LBCC	Branch if carry clear
BCS or LBCS	Branch if carry set

Instructions are as follows:

```
LOC1 EQU $1000

  ORG $4000

Entry:
  CLRA
  CLRB
  LDAA #$85
  LDAB #$92
  CBA
  BCS  YES
  STAA LOC1
BRA Exit
YES STAB LOC1
Exit  BRA Exit
HERE JMP HERE
```

The contents of location $1000 is 92, which is the biggest value (B). Figure 3 shows the contents of the location.

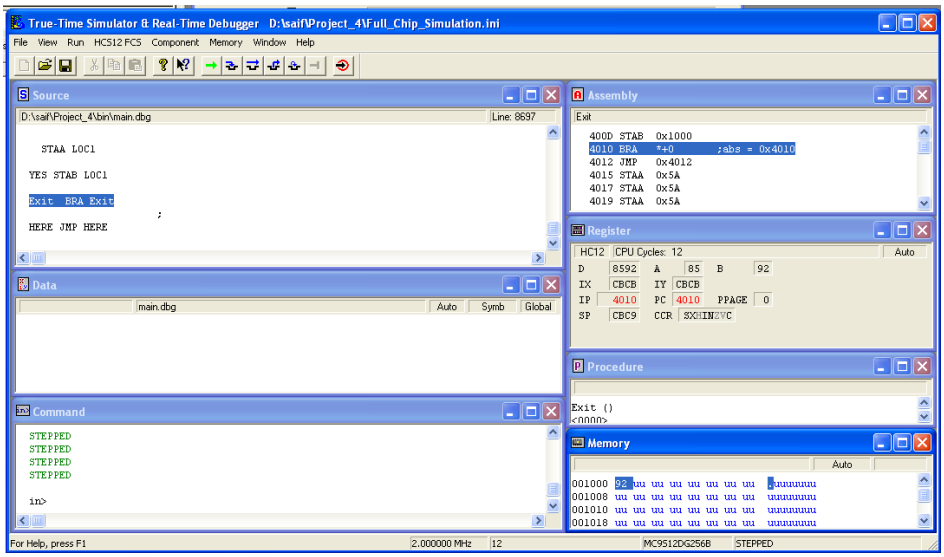

Figure 3: The contents of address $1000 is 92

Pre-Lab Questions:

In this task, the contents of the operand registers are: IX, IY and A will be examined after simulating the following instructions:

```
LOC EQU $1000
LOC2 EQU $1001

  ORG $4000
Entry:
  CLRA
  CLRB

  LDAA #$15
  STAA LOC
  LDAB #$24
  STAB LOC2

  LDX # LOC
  LDX LOC
  LDY #(LOC-1)
  LDAA (LOC+1)
            ;
HERE JMP HERE
```

Table 4 : the value of the operand registers at each single step

	IX	IY	A
LDX # LOC	1000	CBCB	15
LDX LOC	**1524**	CBCB	15
LDY #(LOC-1)	1524	**FFFF**	15
LDAA (LOC+1)	1524	FFFF	24

The instructions use the index registers X & Y to adjust the operand addresses in indirect addressing mode.