**Program No**: 5

**Date**: 27-7-2009

**8-BIT DIVISION**

**PROBLEM DEFINITION**

An ALP to perform the division of two 8-bit numbers.

**THEORETICAL BACKGROUND**

8085 performs division as repeated subtractions. The dividend is stored in the accumulator and divisor in B register. The initial value of the quotient is assumed as zero. Subtraction should be preformed only when the dividend is greater than divisor. Subtraction is continued until dividend is lesser than divisor. For each subtraction, quotient is incremented by one. Finally the quotient and the remainder is stored in the memory.Certain Assembly codes used here are:

CMP Reg:

This instruction compares the contents of the accumulator with the contents of the register specified.

Eg: CMP B

JC:

Jump on carry; ie.CY=1

MVI Reg, 8 bit data:

An immediate 8-bit data is copied to the register specified in the instruction. This is 2 byte instruction.

Eg: MVI B, 00H

**ALGORITHM**

Step 1: Start

Step 2: Load divisor to reg B.

Step 3: Load divident to reg A.

Step 4: Clear reg C to account for quotient.

Step 5: Check whether divisor is less than divident. If so goto step 9.

Step 6: Subtract content of reg B from reg A.

Step 7: Increment content of reg C.

Step 8: Goto step 5.

Step 9: Store the content of reg A (remainder) in memory.

Step 10: Move content of reg C (quotient) to reg A and store it in memory.

Step 11: Stop.

**PROGRAM DEVELOPMENT**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Memory Address | Opcode | Label | Mnemonics | Comments |
| 2000 | 3A 01 22 |  | *LDA 2201H* | Get divisor |
| 2003 | 47 |  | *MOV B,A* | Move it to reg B |
| 2004 | 3A 00 22 |  | *LDA 2200H* | Get divident |
| 2007 | 0E 00 |  | *MVI C,00H* | Clear reg C |
| 2009 | B8 | Again | *CMP B* | Compare content of B & A |
| 200A | DA 12 20 |  | *JC Ahead* | Jump if CY=1 |
| 200D | 90 |  | *SUB B* | Subtract B from A |
| 200E | 0C |  | *INR C* | Increment C |
| 200F | C3 09 20 |  | *JMP Again* | Jump to location |
| 2012 | 32 03 22 | Ahead | *STA 2203H* | Store the remainder |
| 2015 | 79 |  | *MOV A,C* | Get the quotient |
| 2016 | 32 02 22 |  | *STA 2202H* | Store the quotient |
| 2019 | 76 |  | *HLT* | Stop |

**TEST CASES**

**Test case 1:**

|  |  |  |
| --- | --- | --- |
| Memory Address | Data | Comments |
| 2200 | C9 | Divident |
| 2201 | 0A | Divisor |

**Test case 2:**

|  |  |  |
| --- | --- | --- |
| Memory Address | Data | Comments |
| 2200 | 06 | Divident |
| 2201 | 02 | Divisor |

**SUMMARY OF RESULTS**

**Case 1:**

|  |  |  |
| --- | --- | --- |
| Memory Address | Data | Comments |
| 2202 | 01 | 01 is the remainder stored in 2502H. |
| 2203 | 14 | 14 is the quotient stored in 2503H. |

**Case 2:**

|  |  |  |
| --- | --- | --- |
| Memory Address | Data | Comments |
| 2202 | 00 | 00 is the remainder stored in 2502H. |
| 2203 | 03 | 03 is the quotient stored in 2503H. |

**CONCLUSION**

The assembly language program to perform division of two 8-bit numbers was successfully coded and tested.