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ECE 242

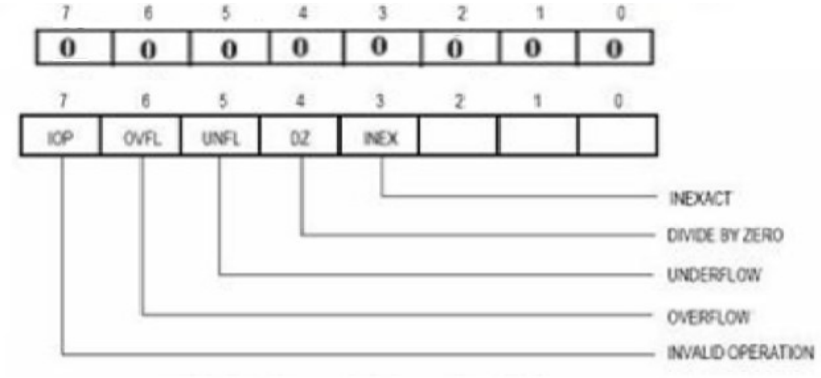
Exercise #3

1. Determine the status if the system status register contains the following hexadecimal values.

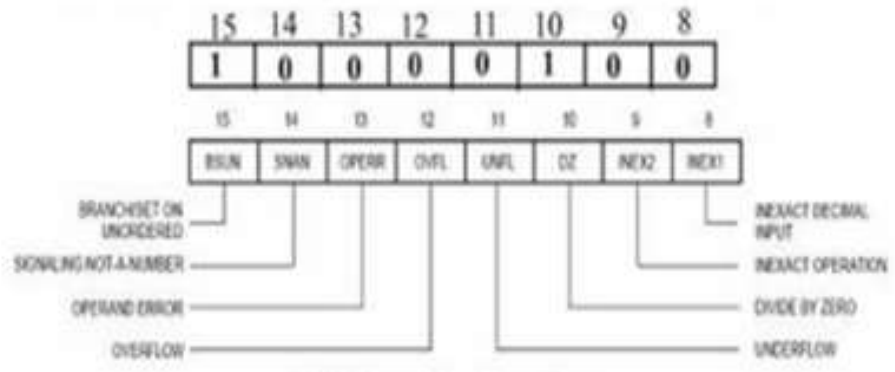
   a) 8400

   - $(8400)_{16} = (1000\ 0100\ 0000\ 0000)_2$

     The bits from (7-0) are 0000 0000:



     The bits from (15-8) are 1000 0100:

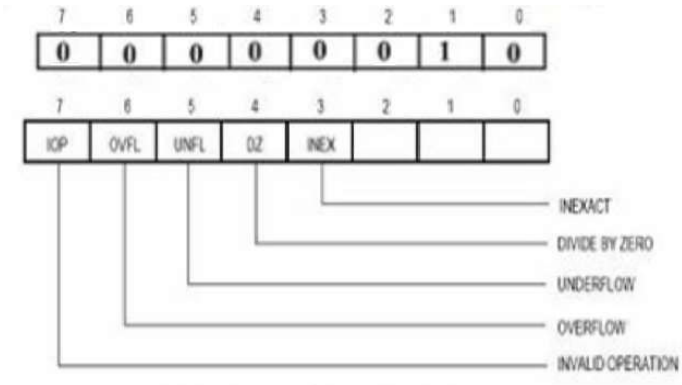


     Thus, there are 'BRANCHSET ON UNORDERED' and 'DIVIDE BY ZERO' exceptions.

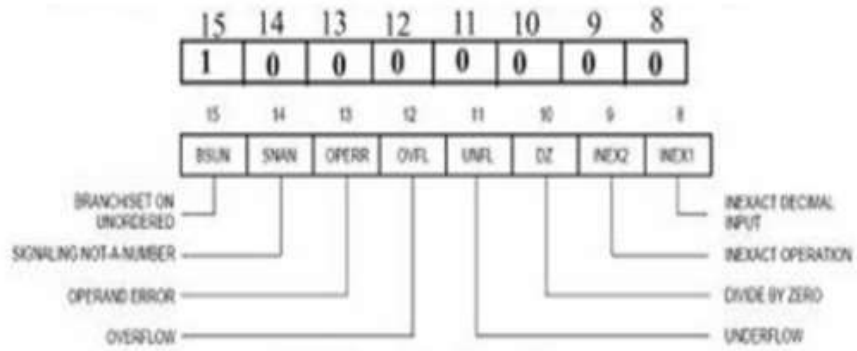
   b) 2002

   - $(2002)_{16} = (1000\ 0000\ 0000\ 0010)_2$

     The bits from (7-0) are 0000 0010:



The bits from (15-8) are 1000 0000:

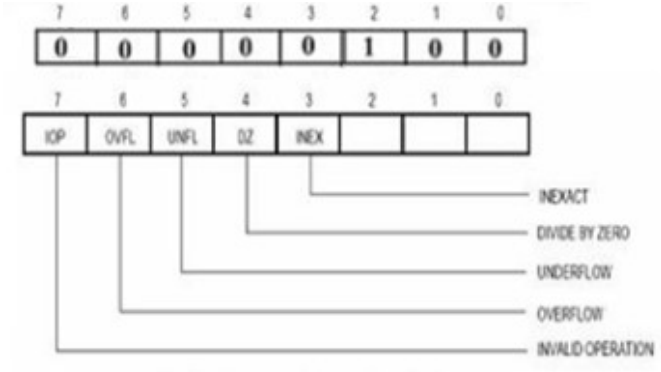


Bit 1 exception is not defined. Thus, there is 'BRANCHSET ON UNORDERED' exception.

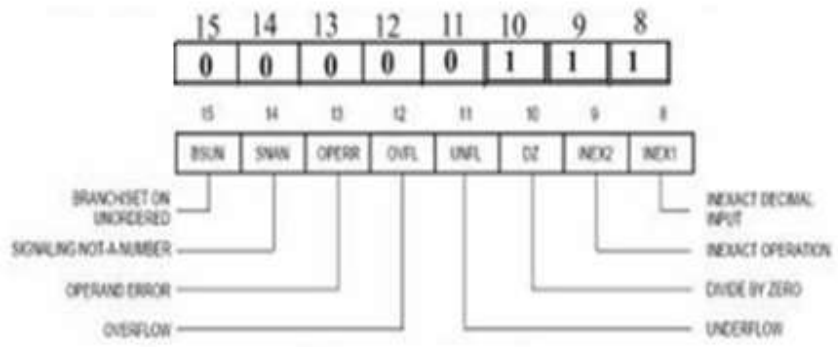
c) 0704

- $(0704)_{16} = (0000\ 0111\ 0000\ 0100)_2$

  The bits from (7-0) are 0000 0100:



The bits from (15-8) are 0000 0111:

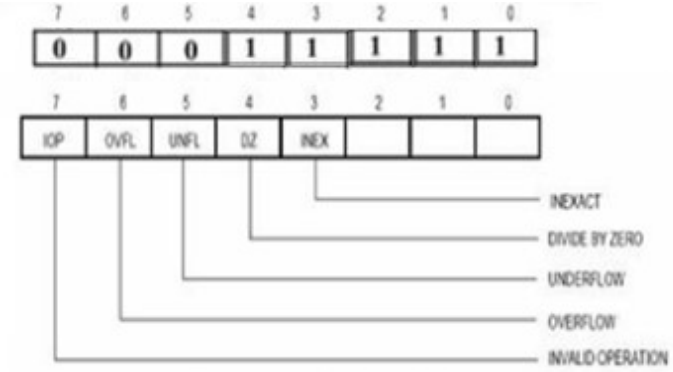


Bit 2 exception is not defined. Thus, there are 'INEXACT DECIMAL INPUT', 'INEXACT OPERATION', and 'DIVIDE BY ZERO' exceptions.

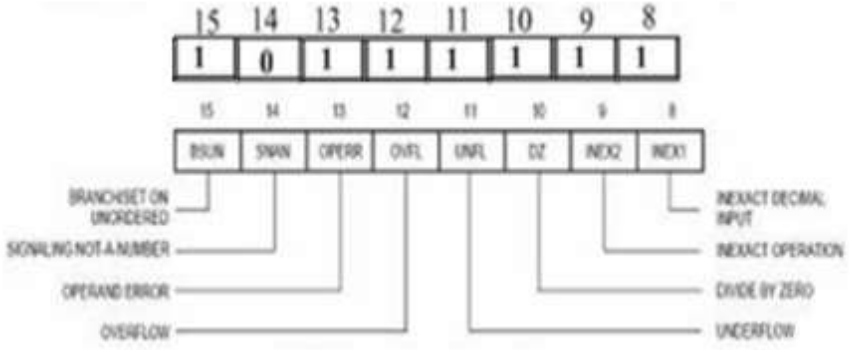
d) BF1F

- $(BF1F)_{16} = (1011\ 1111\ 0001\ 1111)_2$

  The bits from (7-0) are 0001 1111:



The bits from (15-8) are 1011 1111:



Bit 0,1, and 2 exception is not defined. Thus, there are 'INEXACT', 'DIVIDE BY ZERO', 'INEXACT DECIMAL INPUT', 'INEXACT OPERATION', 'DIVIDE BY ZERO', 'UNDERFLOW', 'OVERFLOW', 'OPERAND ERROR', and 'BRANCHSET ON UNORDERED' exceptions.

2. Before each instruction given executes, assume the following hexadecimal contents of D1, D2 and a word location of $1000.

   $D1 = 0601_{16}$
   $D2 = 0805_{16}$
   $(\$1000) = 1913_{16}$

   Determine the results of executing each of the following instructions.

   a) MOVE.B D2, D1
      - Move byte data from D2 register to D1.

        Before execution of instruction

        $D1 = 0601_{16}$ and $D2 = 0805_{16}$

        After execution of instruction

        $D1 = 0605_{16}$ and $D2 = 0805_{16}$ moves only lower byte of D2 into D1.

   b) MOVE.B D1,1001
      - Moves byte data from D1 to memory location 1001.

        Before execution of instruction

        $D1 = 0601_{16}$ and (1001) = -

        After execution of instruction

        1001 = 01 moves lower byte 01 into (1001)

   c) CLR.W $1000
      - Clear instruction is used to move 0 value or clear the contents of memory or register.

        Before execution of instruction

        $(\$1000) = 1913_{16}$

        After execution of instruction

        ($1000) = 0

   d) ADD.B D1, D1
      - Adds source to destination and saves results in destination.

        D1 ← D1 + D1

        $D1 = 0601_{16}$

        Hexadecimal addition:

        D1 = 0601 (Lower byte only)

        <u>D1 = 0601 </u>(Lower byte only)

        <u>D1 = 0602</u>

        After execution of instruction

        D1 = 0602

e) ADD.W $1000, D2

- Adds source to destination and saves results in destination.

  D2 ← D2 + ($1000)

  D2 = 0805_{16} and $1000 = 1913_{16}

  Hexadecimal addition:

  D2 = 0805

  ($1000) = 1913

  D2 = 2118

  After execution of instruction

  D2 = 2118

3. Using hexadecimal values for all of your answers, explain the operation and locations affected by each of the following instructions.

   a) MOVE.W 2000,1500
      - W is word operation. Move content of memory location 2000 (decimal)= 07D0 (hex) into memory location 1500 (decimal)=05DC (hex).

   b) MOVE.W $1500, D2
      - W is word operation. Move the content of memory location 1500 (hex) into data register D2.

   c) MOVE.B 1500, D0
      - B is Byte operation. Move the content of memory location 1500 (decimal)= 05DC (hex) is moved into lower byte of D0 register.

   d) CLR.L $FFC
      - L is Long-byte operation. Clear the content of memory location 00000FFC (hex). All bits are set to 0.

4. Determine the contents of the destination in hexadecimal after each instruction executes.

   a) MOVE.W #'DD', D3
      - Direct data 'DD' (text) =4444(hex) is moved in data register D3. The content of D3 will be D3 =00004444 (hex) if initially D3 was cleared, or D3=xxxx4444 (hex) if initially D3 was containing a nonzero value.

   b) MOVE.L #$C1, D0
      - Direct data C1(hex) is moved into data register D0. The content of D0 will be D0=000000C1(hex) if initially D0 was cleared or D0 was containing a value.

c) MOVE.W #1354, D2

- Direct data 1354(decimal) =054A(hex) is moved into data register D2. The content of D2 will be D2=0000 054A(hex) if D2 initially cleared or D2=xxxx054A if D2 initially nonzero.

d) MOVE.B #1354, D2

- Direct data 1354(decimal) =054A(hex) is moved into data register D2. The content of D2 will be D2=0000004A(hex) if D2 initially cleared or D2=xxxxxx4A if D2 initially nonzero.