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Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

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M16C/60 Series and M16C/20 Series

General-purpose Program for Converting from 4-byte BCD Code to HEX Code

1. Abstract

This program converts 4-byte BCD code into 4-byte HEX code.

2. Introduction

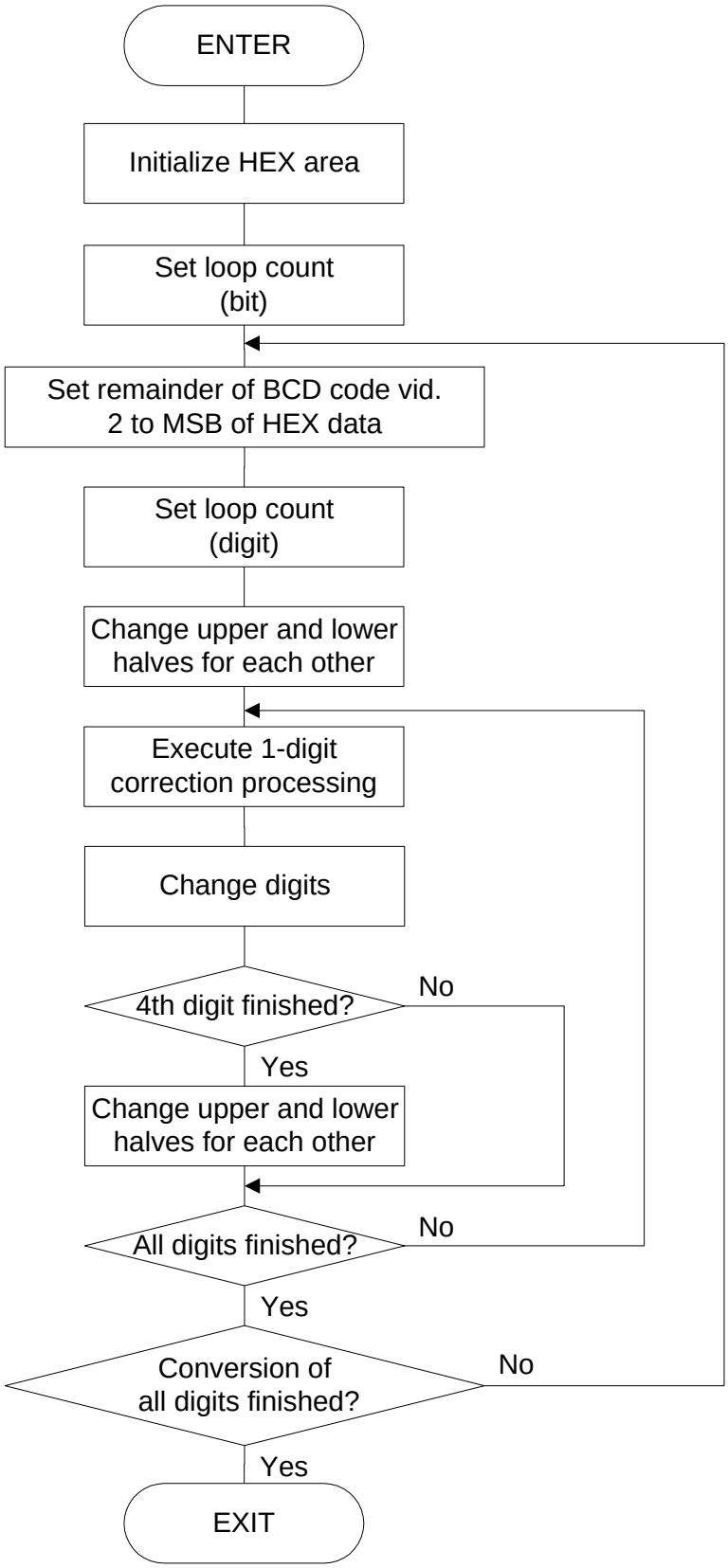
This program converts 4-byte BCD code into 4-byte HEX code. Set the BCD code in R2 and R0 beginning with the upper half. The HEX code is output to R3 and R1 beginning with the upper half.

In this program, the BCD code is divided by 2 (shifted right) and the remainder is loaded into the register as HEX code. If a significant bit is transferred from the BCD's high-order digit to the low-order digit, numeric correction is applied.

Subroutine name : BCDtoHEX_4byte	ROM capacity : 42 bytes
Interrupt during execution : Accepted	Number of stacks used : None

Register/memory	Input	Output	Usage condition
R0	Lower half of BCD code	Indeterminate	←
R1	-	Lower part of HEX code	←
R2	Upper half of BCD code	Indeterminate	←
R3	-	Upper part of HEX code	←
A0	-	0000_{16}	Loop count
A1	-	0000_{16}	Number of digits counter
Usage precautions	The BCD code is destroyed as a result of program execution.		

3. Flowchart


ENTER
Initialize HEX area
Set loop count (bit)
Set remainder of BCD code vid. 2 to MSB of HEX data
Set loop count (digit)
Change upper and lower halves for each other
Execute 1-digit correction processing
Change digits
4th digit finished?
No
Yes
Change upper and lower halves for each other
All digits finished?
No
Yes
Conversion of all digits finished?
No
Yes
EXIT

4. The example of a reference program

```
;***********************************************************************
; *
; M16C General-purpose Programs *
; CPU : M16C *
; *
;***********************************************************************
VromTOP     .EQU     0F0000H             ; Declares start address of ROM
;                                        ;
;=============================================================
; Title     : Converting from BCD code to HEX code
; Outline   : Converts 4-byte BCD code into 4-byte HEX code
; Input     : ----------------------------> Output:
; R0 (Lower half of BCD code)        R0 (Indeterminate)
; R1 ( )                             R1 (Lower part of HEX)
; R2 (Upper half of BCD code)  R2 (Indeterminate)
; R3 ( )                             R3 (Upper part of HEX)
; A0 ( )                             A0 (Indeterminate)
; A1 ( )                             A1 (Indeterminate)
; Stack amount used: None
; Notes:
;=============================================================
            .SECTION    PROGRAM,CODE
            .ORG     VromTOP            ; ROM area
BCDtoHEX_1byte:                         ;
   MOV.W       #0,R1                    ; Initializes HEX area
   MOV.W       #0,R3                    ;
   MOV.B       #32,A0                   ; Sets loop count
BCDtoHEX_1byte_10:                      ;
   SHL.W       #-1,R2                   ; Shifts most significant bit
   RORC.W      R0                       ;
   RORC.W      R3                       ;
   RORC.W      R1                       ;
   MOV.B       #8,A1                    ; Sets loop count
   XCHG.W      R2,R0                    ; Changes upper/lower halves for
                                        ; each other
BCDtoHEX_1byte_20:                      ;
   BTST     3,R0                       ;
   JEQ      BCDtoHEX_1byte_30          ; --> Correction not required
   SUB.W       #3,R0                    ; Executes correction
BCDtoHEX_1byte_30:                      ;
   ROT.W       #-4,R0                   ; Changes digits
   CMP.B       #5,A1                    ; Determines whether high-order
                                        ; correction is completed
   JNE      BCDtoHEX_1byte_40          ; --> Change of upper/lower halves
                                        ; not required
   XCHG.W      R2,R0                    ; Changes upper/lower halves for
                                        ; each other
BCDtoHEX_1byte_40:                      ;
   ADJNZ.W  #-1,A1,BCDtoHEX_1byte_20    ; --> Processes next digit correction
   ADJNZ.W  #-1,A0,BCDtoHEX_1byte_10    ; --> Executes next digit
   RTS                                  ;
;                                       ;
            .END                        ;
```

5. Reference

SOFTWARE MANUAL
M16C/60 M16C/20 Series SOFTWARE MANUAL
(Acquire the most current version from Renesas web-site)

6. Web-site and contact for support

Renesas Web-site

http://www.renesas.com

Contact for Renesas technical support

Mail to : support_apl@renesas.com

REVISION HISTORY

Rev.	Date	Description	
		Page	Summary
1.00	Jul 08, 2002	-	First edition issued

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