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

April 1\textsuperscript{st}, 2010
Renesas Electronics Corporation

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M16C/60 Series and M16C/20 Series

General-purpose Program for Converting from 1-byte HEX Code to BCD Code

1. Abstract

This program converts 1-byte HEX code into 2-byte BCD code.

2. Introduction

This program converts 1-byte HEX code into 2-byte BCD code. Set the HEX code in R1L. The BCD code is output to R0.

In this program, the HEX code is doubled by decimal calculation sequentially beginning with the most significant bit and the results are added. This operation is repeated by a specified number of bits as the HEX code is converted into BCD code.

<table>
<thead>
<tr>
<th>Subroutine name : HEXtoBCD_1byte</th>
<th>ROM capacity : 19 bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interrupt during execution : Accepted</td>
<td>Number of stacks used : None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Register/memory</th>
<th>Input</th>
<th>Output</th>
<th>Usage condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>R0</td>
<td>-</td>
<td>BCD code</td>
<td>←</td>
</tr>
<tr>
<td>R1H</td>
<td>-</td>
<td>00_{16}</td>
<td>Loop count</td>
</tr>
<tr>
<td>R1L</td>
<td>HEX code</td>
<td>Indeterminate</td>
<td>←</td>
</tr>
<tr>
<td>R2</td>
<td>-</td>
<td>Indeterminate</td>
<td>Used to save data</td>
</tr>
<tr>
<td>R3</td>
<td>-</td>
<td>-</td>
<td>Unused</td>
</tr>
<tr>
<td>A0</td>
<td>-</td>
<td>-</td>
<td>Unused</td>
</tr>
<tr>
<td>A1</td>
<td>-</td>
<td>-</td>
<td>Unused</td>
</tr>
</tbody>
</table>

Usage precautions

HEX code is destroyed as a result of program execution.
3. Flowchart

ENTER

Initialize BCD area

Set loop count

Shift most significant bit to C flag

Save register

BCD area x 2 + C flag --> BCD area

Restore register

Loop count finished?

Yes

EXIT

No
4. The example of a reference program

;************************************************************************
; *
; M16C General-purpose Programs *
; CPU : M16C *
; *
;************************************************************************

VromTOP .EQU 0F0000H ; Declares start address of ROM

;======================================
; Title : Converting from HEX code to BCD code
; Outline : Converts 1-byte HEX code into 2-byte BCD code
; Input : ------------------------------> Output:
; R0L (a) R0H ( ) R1H (HEX code) R1L (Indeterminate)
; R1H ( ) R1H (Indeterminate) R2 ( ) R2 (Indeterminate)
; R2 ( ) R3 ( ) R3 (Unindeterminate) A0 ( ) A0 (Unused)
; A1 ( ) A1 (Unused)
; Stack amount used: None
; Notes:
;======================================

.SECTION PROGRAM,CODE
.ORG VromTOP ; ROM area

HEXtoBCD_1byte:
    MOV.W #0,R0 ; Initializes BCD area
    MOV.B #8,R1H ; Sets loop count

HEXtoBCD_1byte_10:
    SHL.B #1,R1L ; Shifts most significant bit to C flag
    XCHG.W R1,R2 ; Saves register
    MOV.W R0,R1 ;
    DADC.W R1,R0 ; Doubled by decimal calculation
                   ; + C flag
    XCHG.W R1,R2 ; Restores register
    ADJNZ.B #-1,R1H,HEXtoBCD_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

<table>
<thead>
<tr>
<th>Rev.</th>
<th>Date</th>
<th>Description</th>
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<tbody>
<tr>
<td>1.00</td>
<td>Jul 08, 2002</td>
<td>First edition issued</td>
</tr>
</tbody>
</table>
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