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

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)
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M16C/60 Series and M16C/20 Series
General-purpose Program for Sorting

1. Abstract
This program sorts data consisting of a specified number of bytes (sizes in bytes) in ascending order.

2. Introduction
This program sorts data consisting of a specified number of bytes (sizes in bytes) in ascending order beginning with a specified address. Set the “number of bytes to be compared - 1” in R0L and the start address of the data in A0.

<table>
<thead>
<tr>
<th>Z</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Sorting succeed</td>
</tr>
<tr>
<td>1</td>
<td>Sorting failed</td>
</tr>
</tbody>
</table>

Subroutine name : SORT  ROM capacity : 28 bytes
Interrupt during execution : Accepted  Number of stacks used : None

<table>
<thead>
<tr>
<th>Register/memory</th>
<th>Input</th>
<th>Output</th>
<th>Usage condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>R0L</td>
<td>Number of compare bytes - 1</td>
<td>Indeterminate</td>
<td>Compare bytes counter</td>
</tr>
<tr>
<td>R0H</td>
<td></td>
<td>Indeterminate</td>
<td>Compare bytes counter</td>
</tr>
<tr>
<td>R1L</td>
<td></td>
<td>Indeterminate</td>
<td>Register used for change</td>
</tr>
<tr>
<td>R1H</td>
<td></td>
<td></td>
<td>Unused</td>
</tr>
<tr>
<td>R2</td>
<td></td>
<td></td>
<td>Unused</td>
</tr>
<tr>
<td>R3</td>
<td></td>
<td></td>
<td>Unused</td>
</tr>
<tr>
<td>A0</td>
<td>Start address</td>
<td>Indeterminate</td>
<td>Compared address</td>
</tr>
<tr>
<td>A1</td>
<td></td>
<td>Indeterminate</td>
<td>Compare address</td>
</tr>
<tr>
<td>Z flag</td>
<td></td>
<td>Sorting succeeded/failed</td>
<td>←</td>
</tr>
</tbody>
</table>

Usage precautions
The number of bytes that can be specified is 2 to 256 bytes.
3. Flowchart

```
ENTER

Number of bytes to be sorted = 0 ?

No

Set compare address and number of compare bytes

Change compare address

Compare data compare data ?

No

Change compared data and compare data for each other

Yes

Number of bytes of compare data?

No

Change compared address

Yes

Number of bytes of compared data?

No

EXIT

Yes
```


4. The example of a reference program

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

VromTOP .EQU 0F0000H ; Declares start address of ROM
;
;=================================================================
; Title : Sorting
; Outline : Sorts given data (2 to 256 bytes) in ascending order
; Input : ------------------------------> Output:
; R0L (Compare bytes - 1) R0L (Indeterminate)
; R0H ( ) R0H (Indeterminate)
; R1L ( ) R1L (Indeterminate)
; R1H ( ) R1H (Unused)
; R2 ( ) R2 (Unused)
; R3 ( ) R3 (Unused)
; A0 (Start address) A0 (Indeterminate)
; A1 ( ) A1 (Indeterminate)
; Stack amount used: None
; Notes : Success or failure of sorting is returned by Z flag
;=================================================================

.SECTION PROGRAM, CODE
.ORG VromTOP ; ROM area

SORT:
;
CMP.B #0,R0L
;
JEQ SORT_EXIT ; --> Number of compare bytes not set

SORT_10:
;
MOV.B R0L,R0H
; Sets number of compare bytes

MOV.W A0,A1
; Sets compare address

SORT_20:
;
INC.W A1
; Changes compare address

CMP.B [A0],[A1]
; Compare data to see if large or small

JGEU SORT_30
; --> Sorting unnecessary

MOV.B [A0],R1L
; Changes compared and compare data for each other

XCHG.B R1L,[A1]
;
MOV.B R1L,[A0]
;

SORT_30:
;
ADJNZ.B #-1,R0H,SORT_20
; --> Looped for compare data

INC.W A0
; Changes compared address

ADJNZ.B #-1,R0L,SORT_10
; --> Looped for compared data

FCLR Z
; Sorting completed

SORT_EXIT:
;
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>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>Jul 08, 2002</td>
<td>First edition issued</td>
</tr>
</tbody>
</table>
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