To our customers,

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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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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

M16C/80 Series

Indirect Subroutine Call

1.0 Abstract

This program executes an indirect subroutine call instruction after setting the relative jump address forindirect jump. It also executes an indirect subroutine call instruction by using a 24-bit absolute address.

2.0 Introduction

For indirect jump based on relative addresses, this program uses an transfer instruction (MOV) to set the relative jump address for the indirect jump. In this program, since relative addresses are within the range that can be represented with 8 bits, ".B (byte size)" is used to set the offset data.
For indirect jump based on absolute addresses, this program adds the content of the address register, with its sign ignored, to the start address of the memory area where 24-bit absolute addresses are stored and jumps to the memory location (24-bit absolute address) indicated by the result. The memory area in which to store 24-bit absolute addresses is allocated in units of 3 bytes.

(1) Indirect subroutine call (relative)

Subroutine name : SUBIND_W	ROM capacity : 20byte
Interrupt during execution:Accepted	Number of stacks used : 3byte

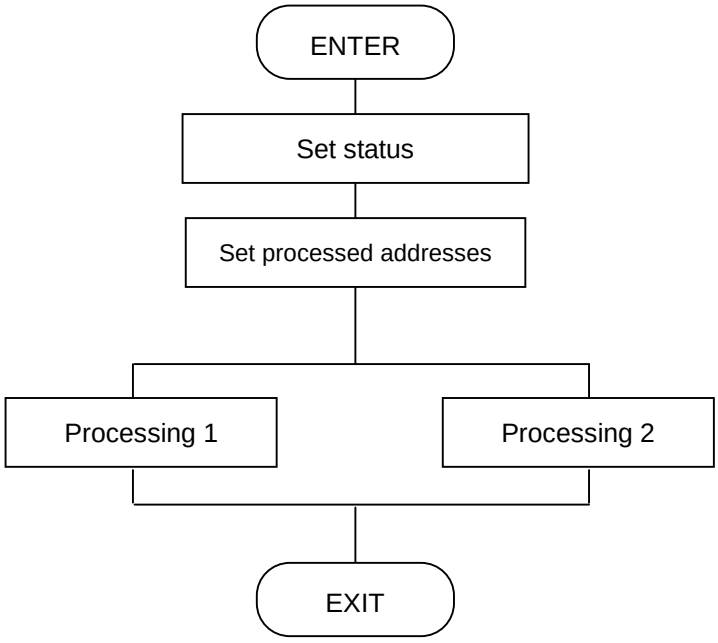
Register/memory	Input	Output	Usage condition
R0	-	-	Unused
R1	-	-	Unused
R2	-	-	Unused
R3	-	-	Unused
A0	-	Indeterminate	Number of transfers performed
A1	-	Indeterminate	Processing relative address
MODE	Current processing status	Next processing status	←
Usage precautions	The indirect jump address set here is a relative address.		

(1) Indirect subroutine call (relative)

Subroutine name : SUBIND_A	ROM capacity : 27byte
Interrupt during execution:Accepted	Number of stacks used : 3byte

Register/memory	Input	Output	Usage condition
R0	-	-	Unused
R1	-	-	Unused
R2	-	-	Unused
R3	-	-	Unused
A0	-	Indeterminate	Address pointer
A1	-	-	Unused
MODE	Current processing status	Next processing status	←
Usage precautions	The indirect jump address set here is a 24-bit absolute address.		

3.0 Flowchart



4.0 Programming Code

```
;*****************************************************************
; *
;       M16C Program Collection
;       CPU : M16C/80 series
; *
;*****************************************************************
VramTOP     .EQU    0000400H                ; Declares start address of RAM
VromTOP     .EQU    0FE0000H                ; Declares start address of ROM
Vsb         .EQU    0400H                   ; Sets SB
            .SECTION        RAM,DATA
            .ORG            VramTOP         ; RAM area
MODE:       .BLKB   1                       ; Processing status
MD_0        .EQU    0                       ; Status No. 0
MD_1        .EQU    1                       ; Status No. 1
;;
;=====================================================================
;   Title: Indirect subroutine call
;   Outline: Branches processing using an indirect subroutine call (relative)
;   Input:      ------------------------------>     Output:
;   R0( )                                   R0(Unused)
;   R1( )                                   R1(Unused)
;   R2( )                                   R2(Unused)
;   R3( )                                   R3(Unused)
;   A0( )                                   A0(Indeterminate)
;   A1( )                                   A1(Indeterminate)
;   Stack amount used: 3byte
;   Notes:
;=====================================================================
            .SECTION        PROGRAM,CODE
            .ORG            VromTOP                 ; ROM area
            .SB             Vsb                     ; Declares SB register value

SUBIND_W:                                           ;
    MOV.B   MODE,A0                                 ;
    MOV.B   JUMPaddress[A0],A1                      ; Sets jump address
JUMP_offset:                                        ;
    JSRI.W  A1                                      ; Jumps to each processing
    RTS                                             ;
MODE_0:                                             ;
    MOV.B   #MD_1,MODE                              ;
    RTS                                             ;
MODE_1:                                             ;
    MOV.B   #MD_0,MODE                              ;
    RTS                                             ;
JUMPaddress:                                        ;
            .BYTE   MODE_0-JUMP_offset              ;
            .BYTE   MODE_1-JUMP_offset              ;
```

```
;=======================================================================
;     Title: Indirect subroutine call
;     Outline: Branches processing using an indirect subroutine call (absolute).
;     Input:        ------------------------------>          Output:
;     R0( )                                       R0(Unused)
;     R1( )                                       R1(Unused)
;     R2( )                                       R2(Unused)
;     R3( )                                       R3(Unused)
;     A0( )                                       A0(Indeterminate)
;     A1( )                                       A1(Unused)
;     Stack amount used: 3byte
;     Notes:
;=======================================================================
SUBIND_A:
    MOV.B       MODE,A0                                 ;
    SHL.W       #1,A0                                   ;
    ADD.B       MODE,A0                                 ; Sets jump pointer
    JSRI.A      JSRaddress[A0]                          ; Jumps to each processing
    RTS                                                 ;
JSR_0:                                                  ;
    MOV.B       #MD_1,MODE                              ;
    RTS                                                 ;
JSR_1:                                                  ;
    MOV.B       #MD_0,MODE                              ;
    RTS                                                 ;
JSRaddress:                                             ;
        .ADDR   JSR_0                                   ;
        .ADDR   JSR_1                                   ;
  ;                                                     ;
                .END ;
```

5.0 Reference

MCU Technical Information Homepage

http://www.infomicom.maec.co.jp/indexe.htm
(or http://www.mdece.com/ , http://www.mitsubishichips.com/products/mcu/index.html or your local Web Site.)

Technical Support

E-mail: support@apl.maec.co.jp
(or your local support E-mail address. A private e-mail address should NOT be used.)

Data Sheet

M16C/80 group
(Use the latest version on the Homepage: http://www.infomicom.maec.co.jp/indexe.htm)

User's Manual

M16C/80 group
(Use the latest version on the Homepage: http://www.infomicom.maec.co.jp/indexe.htm)

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Renesas Technology Corp.

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