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Renesas Electronics Corporation

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R8C/Tiny Series

General-purpose Program for Indirect Subroutine Call

1. Abstract

This program executes an indirect subroutine call instruction after setting the relative jump address for indirect jump. It also executes an indirect subroutine call instruction by using a 20-bit absolute address.

2. Introduction

For indirect jump based on relative addresses, this program uses an extended access instruction (LDE) 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 20-bit absolute addresses are stored and jumps to the memory location (20-bit absolute address) indicated by the result. The memory area in which to store 20-bit absolute addresses is allocated in units of 3 bytes.

(1) Indirect subroutine call (relative)

Subroutine name : SUBIND_W	ROM capacity : 19 bytes
Interrupt during execution : Accepted	Number of stacks used : 3 bytes

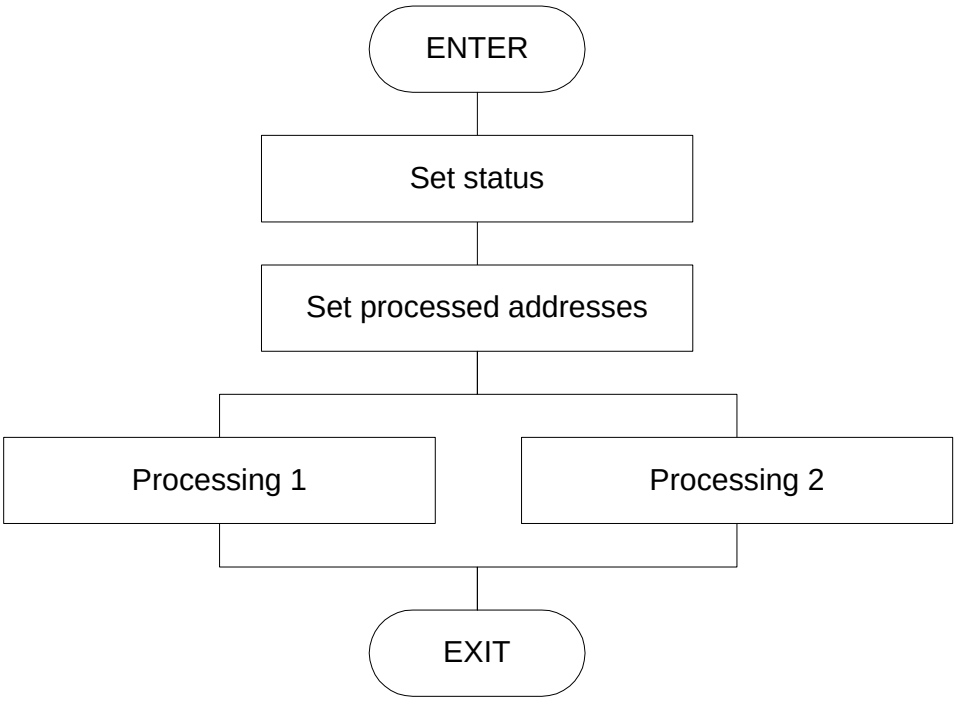
Register/memory	Input	Output	Usage condition
R0	-	-	Unused
R1	-	-	Unused
R2	-	-	Unused
R3	-	-	Unused
A0	-	Indeterminate	Processing status
A1	-	Indeterminate	Processing relative address
MODE	Current processing status	Next processing status	←
Usage precautions	The indirect jump address set here is a relative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

(2) Indirect subroutine call (absolute)

Subroutine name : SUBIND_A	ROM capacity : 26 bytes
Interrupt during execution : Accepted	Number of stacks used : 3 bytes

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 20-bit absolute address.		

3. Flowchart



4. The example of a reference program

```
;***************************************************************************************
;                                                                                      *
;    M16C Program Collection No. 4                                                     *
;    CPU            : R8C/Tiny                                                         *
;                                                                                      *
;***************************************************************************************
VramTOP       .EQU      000400H                    ; USER PROGRAM RAM START ADDRESS
VromTOP       .EQU      00D000H                    ; 12Kbyte Flash version
Vsb           .EQU      000400H                  ; 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: 3 bytes
;=======================================================================================
              .SECTION  PROGRAM,CODE             ;
              .ORG      VromTOP                  ; ROM area
              .SB       Vsb                    ; Declares SB register value
              .SBSYM        MODE                 ;
    LDC           #Vsb,SB                        ;
SUBIND_W:                                      ;
    MOV.B   MODE,A0                            ;
    LDE.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: 3 bytes
;=======================================================================================
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. Reference

SOFTWARE MANUAL
R8C/Tiny 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	Dec 24, 2003	-	First edition issued

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