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April 1st, 2010
Renesas Electronics Corporation

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H8SX Family
MOVMD.L Block Transfer Instruction

Introduction
Performs block transfer using the MOVMD.L block transfer instruction.

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1. Specifications

- Transfer source data in ROM is transferred to RAM using the “movmdl” function, a MOVMD.L block transfer instruction intrinsic function.
- The MOVMD.L instruction transfer unit is longword size (32 bits = 4 bytes), and the number of transfers can be specified in the range 1 to 65,536.
- The number of transfers is set to 16, and a total of $16 \times 4 = 64$ bytes are transferred.

![Diagram of MOVMD.L Block Transfer Instruction]

Figure 1 MOVMD.L Block Transfer Instruction

2. Functions Used

This sample task shows an example of use of the movmdl function.
3. Principles of Operation

An overview of the operation of this sample task is shown below.

![Diagram showing the operation of the MOVMD.L Block Transfer Instruction](image)

**Figure 2** Example of MOVMD.L Block Transfer Instruction Operation
4. Development Environment

4.1 Development Support Tool Versions

The development environment support tools of this sample task is shown in table 1.

Table 1 Development Support Tool Versions

<table>
<thead>
<tr>
<th>Software Name</th>
<th>Version Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH38.EXE</td>
<td>C compiler (H8S, H8/300 series C/C++ compiler)</td>
</tr>
<tr>
<td></td>
<td>Ver. 6.0.00.005</td>
</tr>
<tr>
<td>ASM38.EXE</td>
<td>Assembler (H8S, H8/300 series cross assembler)</td>
</tr>
<tr>
<td></td>
<td>Ver. 6.0.01.005</td>
</tr>
<tr>
<td>OPTLNK.EXE</td>
<td>Linkage editor (optimizing linkage editor)</td>
</tr>
<tr>
<td></td>
<td>Ver. 8.0.00.020</td>
</tr>
<tr>
<td>LBG38.EXE</td>
<td>Library configuration tool (H8S, H8/300 series C/C++ standard library generator)</td>
</tr>
<tr>
<td></td>
<td>Ver. 2.0.00.000</td>
</tr>
</tbody>
</table>

4.2 C compiler Option Settings

C compiler option settings for this sample task are shown in table 2.

Table 2 C compiler Option Settings

<table>
<thead>
<tr>
<th>Option</th>
<th>Set Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPu</td>
<td>H8SX:24:MD</td>
</tr>
<tr>
<td>Code</td>
<td>Machinecode</td>
</tr>
<tr>
<td>OPtimize</td>
<td>1</td>
</tr>
<tr>
<td>REGParam</td>
<td>3</td>
</tr>
<tr>
<td>SPeed</td>
<td>Register, SHift, STuct, Expression</td>
</tr>
</tbody>
</table>
5. Description of Software

5.1 Modules

Modules used by this sample task are shown in table 3.

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>main</td>
<td>Main routine</td>
</tr>
<tr>
<td></td>
<td>Calls movmdltst function.</td>
</tr>
<tr>
<td>movmdltst</td>
<td>movmdl test program</td>
</tr>
<tr>
<td></td>
<td>Performs block transfer using movmdl function.</td>
</tr>
</tbody>
</table>

5.2 Arguments

No arguments are used by this sample task.

5.3 Internal Registers Used

No internal registers are used by this sample task.

5.4 RAM Usage

Table 4 describes RAM usage in this sample task.

<table>
<thead>
<tr>
<th>Label</th>
<th>Size</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>dst_ram[16]</td>
<td>16 × 4 bytes</td>
<td>Transfer destination area</td>
</tr>
</tbody>
</table>

5.5 Constants Used

Constants used by this sample task are shown in table 5.

<table>
<thead>
<tr>
<th>Label</th>
<th>Size</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>src_rom[16]</td>
<td>16 × 4 bytes</td>
<td>Transfer destination area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>long src_rom[16] ={</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x00, 0x01, 0x02, 0x03, 0x04, 0x05, 0x06, 0x07, 0x08, 0x09, 0x0A, 0x0B, 0x0C, 0x0D, 0x0E, 0x0F,</td>
</tr>
</tbody>
</table>
|           |           | }
6. Flowcharts

6.1 Main Routine

```
main
CCR = H'80
Disable interrupts
movmdltst()
movsdl test program
execution
```

6.2 movmdl Test Program

```
movmdltst
i = 0

i < 16?
Yes
No

movmdl()
Transfer destination: dst_ram
Transfer source: src_rom
Maximum number of transfer bytes: 16
i +=

End
```

6.3 Link Address Specifications

<table>
<thead>
<tr>
<th>Section Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV1</td>
<td>H'000000</td>
</tr>
<tr>
<td>P,D</td>
<td>H'001000</td>
</tr>
<tr>
<td>B</td>
<td>H'FEC000</td>
</tr>
</tbody>
</table>
7. Program Listing

7.1 C Program

/************************************************************/
/*                                                          */
/*  H8SX Family                                             */
/*  Application Note                                        */
/*                                                          */
/*  'MOVMD.L'                                               */
/*                                                          */
/*  Function                                                */
/*                                                          */
/*  : MOVMD.L                                               */
/*                                                          */
/*                                                          */
/************************************************************/

#include <machine.h>

/************************************************************/
/*  Function define                                         */
************************************************************/
void main ( void );
void movmdltst ( void );

/************************************************************/
/*  RAM define                                              */
************************************************************/
long dst_ram[16];

/************************************************************/
/*  ROM define                                              */
************************************************************/
long src_rom[16] = {
  0x00, 0x01, 0x02, 0x03, 0x04, 0x05, 0x06, 0x07,
  0x08, 0x09, 0x0A, 0x0B, 0x0C, 0x0D, 0x0E, 0x0F,
};

/************************************************************/
/*  Vector Address                                          */
************************************************************/
#pragma section V1 /* VECTOR SECTION SET */
void (*const VEC_TBL1[]) (void) = {
  main /* 00 Reset */
};

#pragma entry main(sp=0xFFC000)
#pragma section /* P */
/************************************************************/
/*  Main Program                                            */
************************************************************/
void main ( void )
{
    set_ccr(0x80);                        /* Initialize CCR/Interrupt Disable */
    movmdltst();

    while(1);
}

/***************************************************************************/
/* MOVMD function Test Program */
/***************************************************************************/
void movmdltst ( void )
{
    unsigned char i;

    for ( i=0; i<16; i++)               /* Ram area memory fill "0xFFFFFFFF"*/
        dst_ram[i] = 0xFFFFFFFF;

    movmdl ( dst_ram, src_rom, 16 );    /* Copy src_rom --> dst_ram */
}
7.2 Assembly Language Code Generated by the C compiler

```assembly
;*** File main.c , Line 178

 00000000  _main:                               ; function: main
 00000000 7A0700FFC000           MOV.L       #16760832,SP
 00000006 F880                   MOV.B       #128:8,R0L
 00000008 0308                   LDC.B       R0L,CCR
 0000000A 5500                   BSR         _movmdltst:8
 0000000C L40:                    
 0000000C 4000                   BRA         L40:8
 0000000E _movmdltst:                         ; function: movmdltst
 0000000E 01206DF4               STM.L       (ER4-ER6),@-SP
 00000012 1888                   SUB.B       R0L,R0L
 00000014 L43:                    
 00000014 7A74FFFFFFFD800       MOV.L       #-1:32,@(_dst_ram:32,R0L.B)
 00000000
 00000020 0A08                   INC.B       R0L
 00000022 A810                   CMP.B       #16:8,R0L
 00000024 4500                   BLO         L43:8
 00000026 7A0600000000       MOV.L       #_dst_ram,ER6
 00000032 79040010       MOV.W       #16:16,R4
 00000036 7BB4       MOVMD.L
 00000038 5426       RTS/L       (ER4-ER6)

D                                                                 ; section
 00000000  _src_rom:                           ; static: src_rom
 00000000 0000000000000001       .DATA.L     H'00000000,H'00000001,H'00000002,
                                  H'00000003,H'00000004,H'00000005,H'00000006,H'00000007,H'00000008,H'00000009,
                                  H'0000000A,H'0000000B,H'0000000C,H'0000000D,H'0000000E,H'0000000F
 0000000200000003
 0000000400000005
 0000000600000007
 0000000800000009
 0000000A0000000B
 0000000C0000000D
 0000000E0000000F

B                                                                 ; section
 00000000  _dst_ram:                           ; static: dst_ram
 00000000 00000040       .RES.L      16

CV1                                                               ; section
 00000000  _VEC_TBL1:                          ; static: VEC_TBL1
 00000000 00000000       .DATA.L     _main
```
## Revision Record

<table>
<thead>
<tr>
<th>Rev.</th>
<th>Date</th>
<th>Page</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>Sep.15.04</td>
<td>—</td>
<td>First edition issued</td>
</tr>
</tbody>
</table>
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