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38D2 Group

ROM Correction Function (Additional Write Using QZROM)

1. Abstract

The following article introduces and shows an example of how to use the ROM Correction Function (Additional Write Using QZROM) on the 38D2 Group device.

2. Introduction

The application explained in this document applies to the following MCU and parameter(s):
Applicable MCU: 38D2 Group
Unused ROM area: FFh

This sample program may include operations of unused bit functions for the convenience of the SFR bit layout. Set the values according to the operational conditions of the user system.

3. Contents

3.1 ROM Correction Function (Additional Write Using QZROM)

The program in the ROM can be partially corrected. Set the start address of the instruction to be corrected (Op code address of the start instruction) to the ROM correction address high-order register and low-order register. When executing the program, if the value of the program counter corresponds with the value set to the ROM correction address register, the program branches to the ROM correction vector. The correction program can be executed by setting the correction program to the correction vector. Use the JMP instruction (three-byte instruction) when returning from the correction program to the main program.

A maximum of two parts can be corrected and two vectors can be used as ROM correction vectors. In addition, the user can select the ROM correction vector in the RAM area or that in the ROM area at the ROM correction memory selection bit.

	RAM Area RC2 = 0	ROM Area RC2 = 1
Vector 1	0100h	F100h
Vector 2	0120h	F120h

The ROM correction function is controlled by the ROM correction address 1 enable bit and the ROM correction address 2 enable bit.

Figure 3.1 shows the Relevant Register Settings, and Figure 3.2 shows the ROM Correction Function Operation Example (ROM correction 1, RC2 = 1).

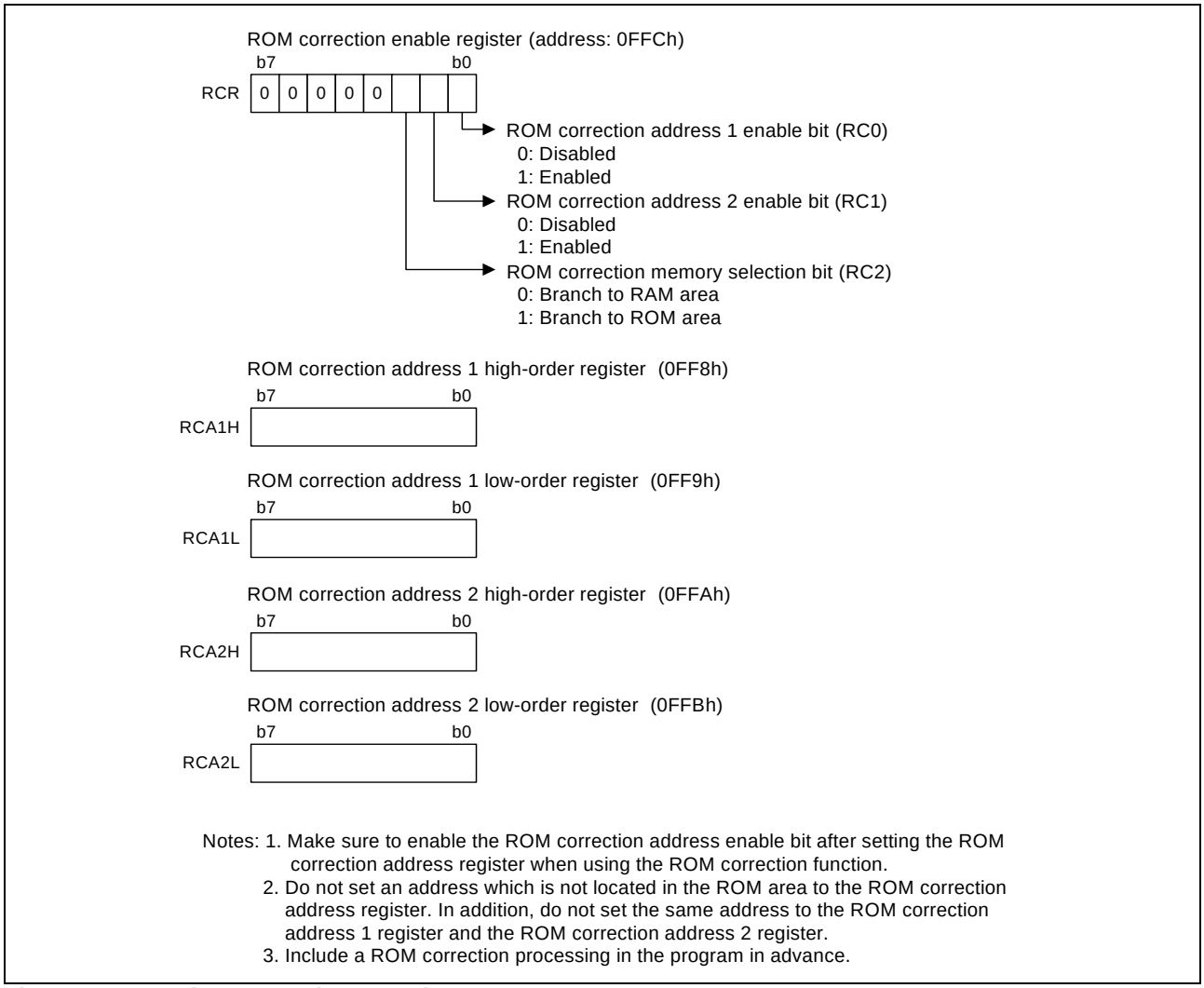

Figure 3.1 Relevant Register Settings

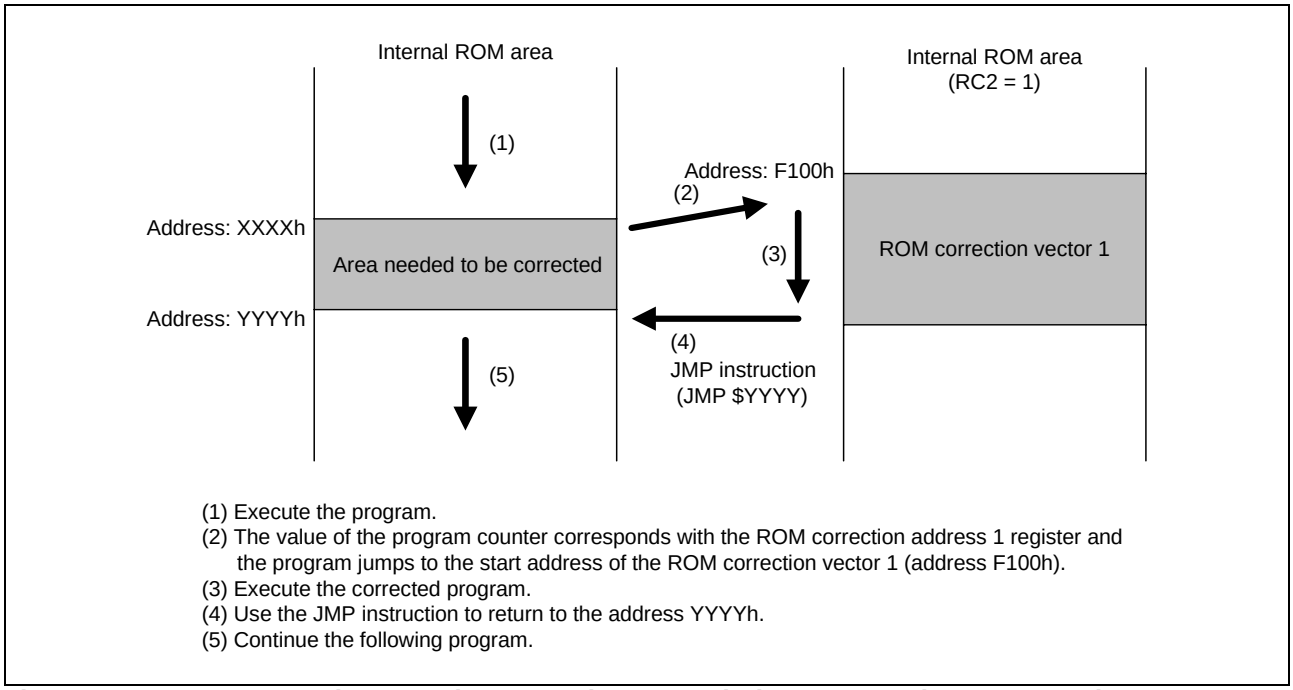

Figure 3.2 ROM Correction Function Operation Example (ROM correction 1, RC2 = 1)

3.2 Outline

The program cannot be rewritten, but additional data can be written to blank areas in the QzROM version. This application note indicates how to correct the program by writing the ROM correction program additionally to the QzROM.

In this application example, the start-up processing determines whether a ROM correction is necessary or not. When a ROM correction is necessary, the program used for the ROM correction function is set. No hardware like an external switch is required since the program determines the necessity of the ROM correction by data on the ROM area (additionally written area).
Refer to Chapter 4. Example of Program Development Procedure when developing a program.

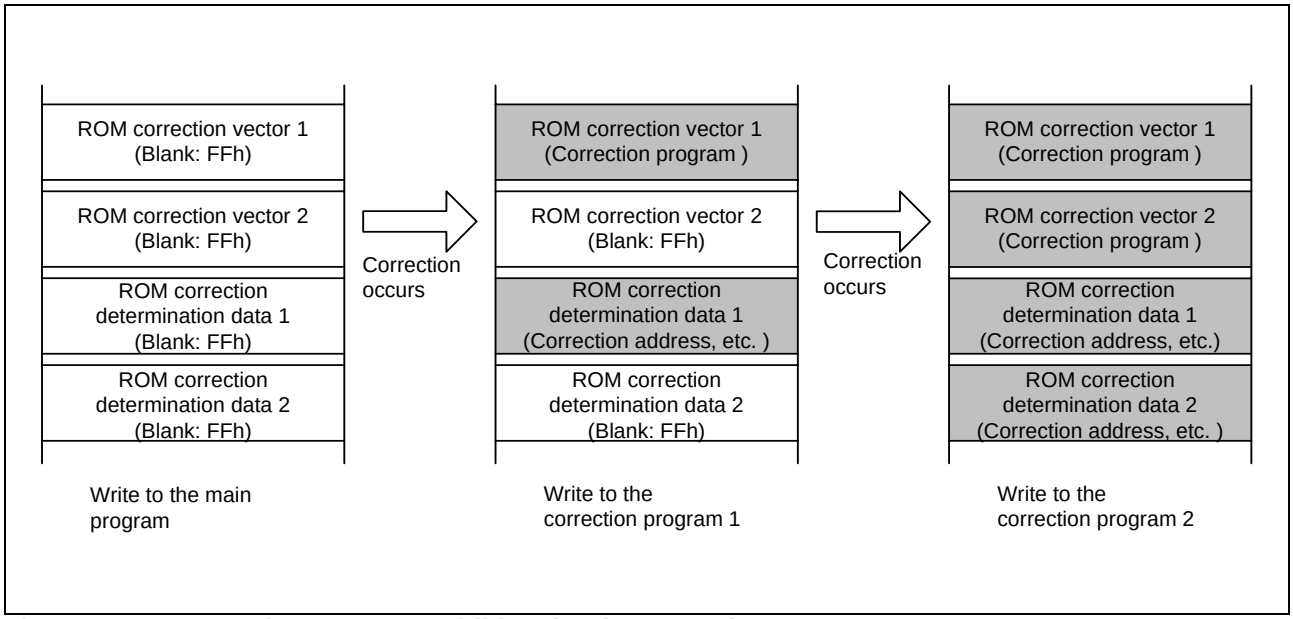

Figure 3.3 Correction Program Additional Write Example

3.3 Specifications

The ROM area is used for the ROM correction vector.

The JMP instruction is written to the ROM correction vector and the program jumps to the correction program in the other area to be prepared for a correction program over 32 bytes.

The ROM correction determination data 1, 2 are both 8 bytes (total 16 bytes), which consist of the identification code (ID code) 1, 2 (6 bytes each) and the ROM correction address data 1, 2 (2 bytes each). An additional 16 bytes are used aside from the ROM correction vector 1, 2. Set any characters or values to the ID code 1, 2. In addition, the size and location of the ROM correction determination data 1, 2 can be changed.

The ID code 1, 2 written to the specific address of the ROM area is determined by the start-up processing. When the ID code 1, 2 corresponds with the expected value, the start address of the program to be corrected is set from the ROM correction address data 1, 2 to the ROM correction address 1, 2 registers, and the ROM correction function is enabled. When the ID code 1, 2 does not correspond with the expected value, the MCU determines that the ROM correction program is not written or an unauthorized ROM correction program is written (an unauthorized user writes the correction program) and disables the ROM correction function so that the correction program is not executed.

Make sure to configure the start-up processing to the protect area 1.

The expected value is “M38D24” in this application example.

Figure 3.4 shows the ROM Map In Case of M38D24G4.

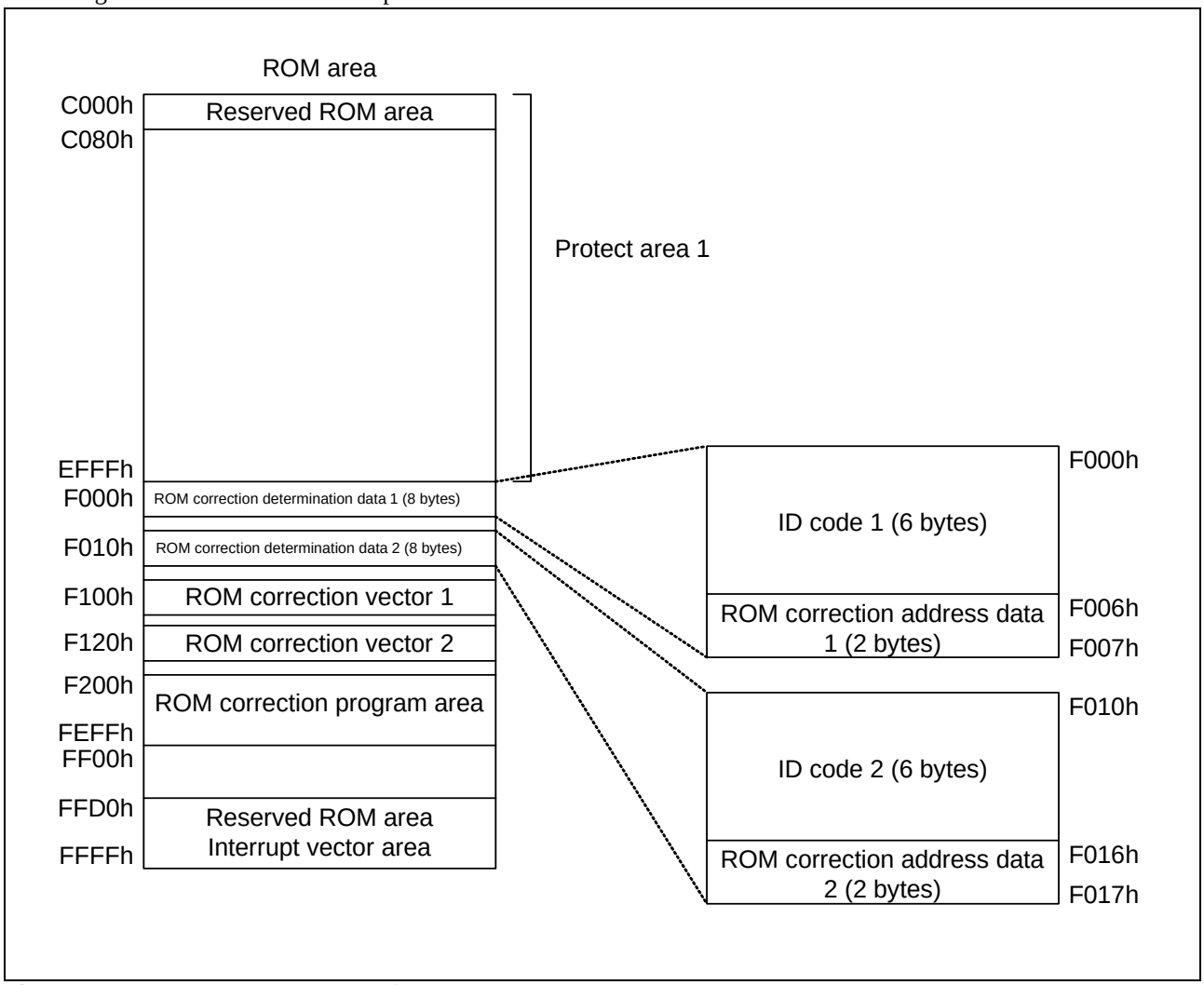

Figure 3.4 ROM Map In Case of M38D24G4

3.4 Control Procedure

Figure 3.5 shows the Control Procedure for Start-up Processing.

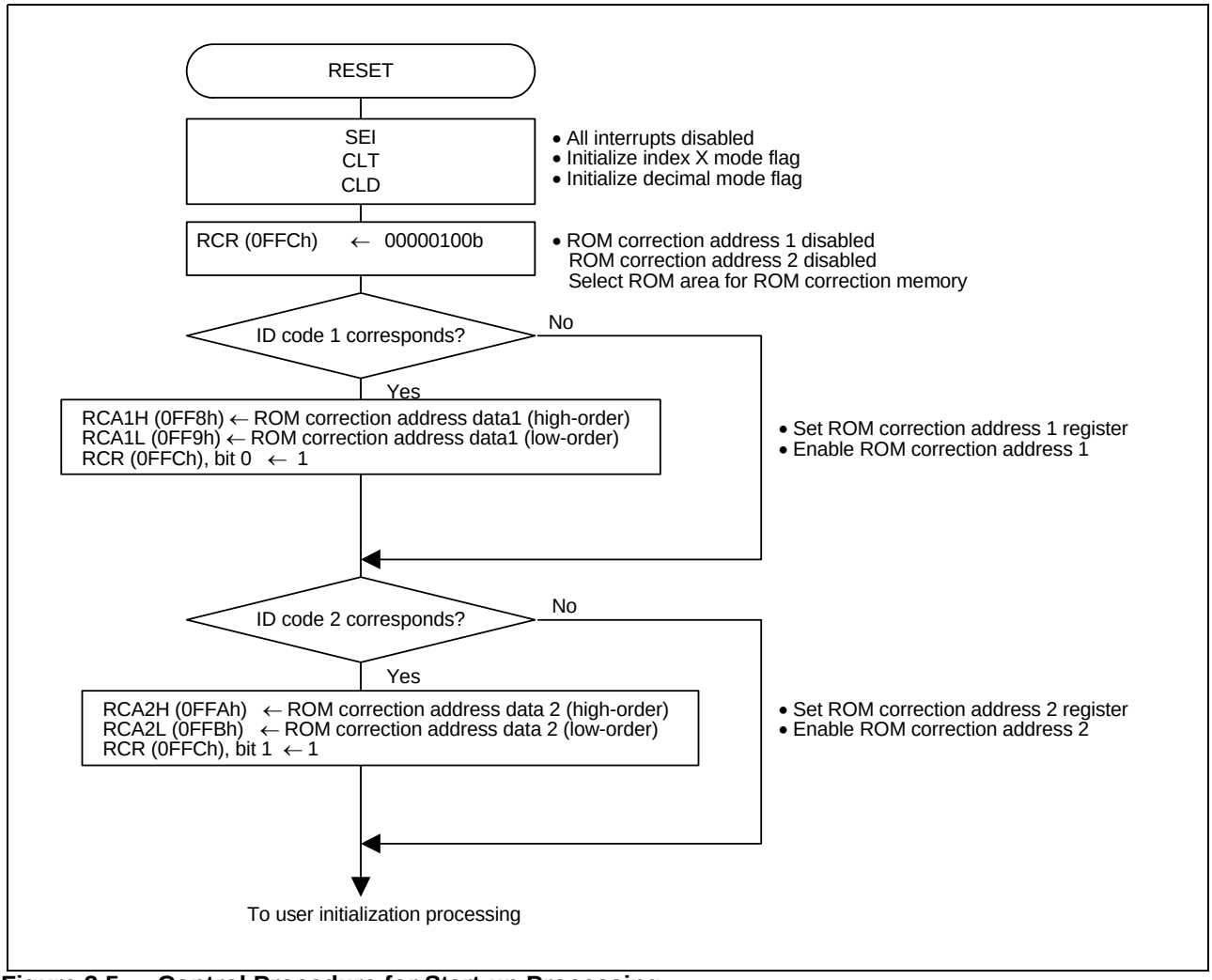

Figure 3.5 Control Procedure for Start-up Processing

4. Example of Program Development Procedure

This chapter explains the procedure for developing a program or executing the ROM correction.

Figure 4.1 shows the Development Procedure Example.

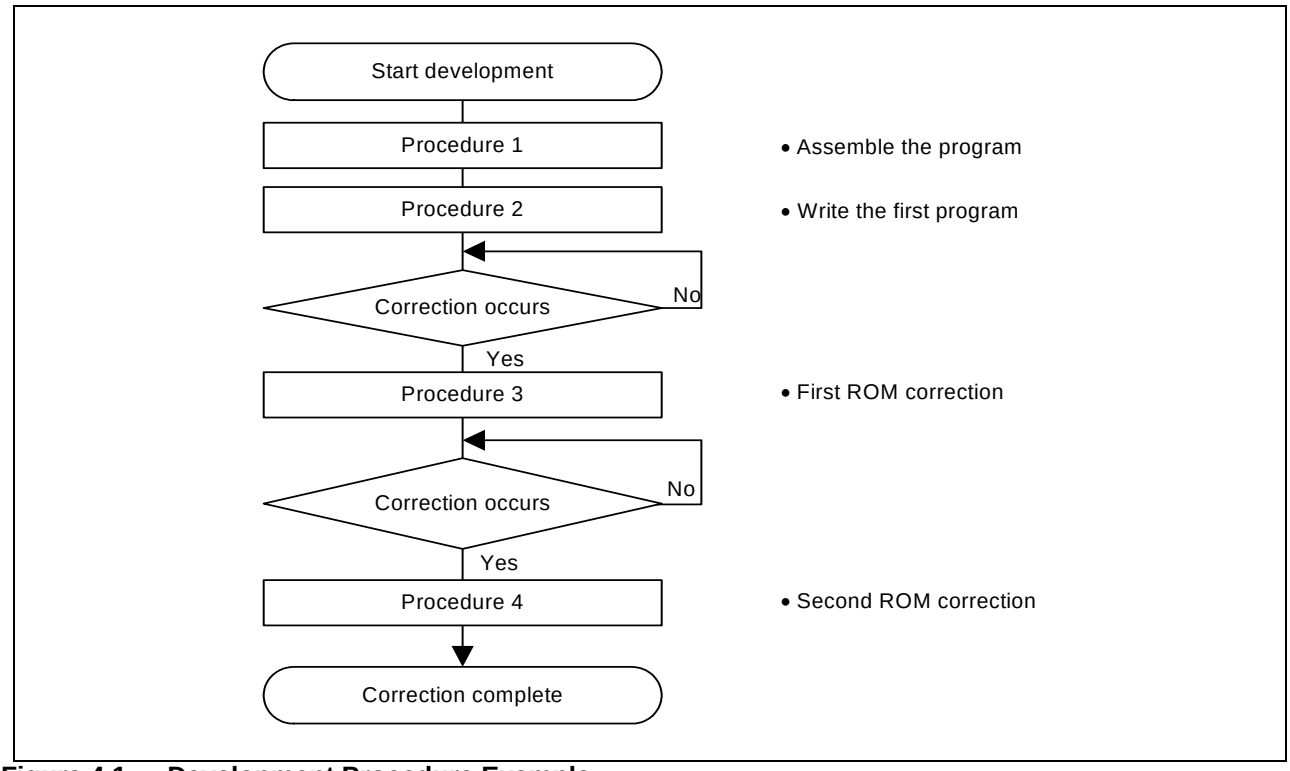

Figure 4.1 Development Procedure Example

Procedure 1:

Files necessary for this application example and files used for the user program are separated.
The following three files are used in this application example.
(Multiple files can be used for the user program).

(1) Start-up processing file: startup.a74
(2) Correction program file: correct.a74
(3) User program processing file: user.a74

The link order in this application example is (1), (3) and (2).

Procedure 2:

Write the program to the QzROM area.
Protect the protect area 1.

Procdure 3:
Write the JMP instruction to branch to the start address of the correction address 1 into the ROM correction vector 1 in the program file for correction (correct.a74).

```
        .section    rom_corre_vector1
        .org        $F100
;
        .blkb       $20             ;area securing
```

Write JMP instruction to the correction program 1.

```
        .section    rom_corre_vector1
        .org        $F100
;
        JMP         RC_PROGRAM1     ;jump to ROM correction program 1
```

Write the ID code 1 and the ROM correction address data 1 into the ROM correction determination data 1 in the same file.

```
        .section    rom_corre_ID1
        .org        $F000
;
        .blkb       6               ;area securing
;
        .section    rom_corre_addr1
        .org        $F006
;
        .blkb       2               ;area securing
```

Write ROM correction determination data 1.

```
        .section    rom_corre_ID1
        .org        $F000
;
        .byte       'M38D24'        ;ID code 1
;
        .section    rom_corre_addr1
        .org        $F006
;
        .word       $C148           ;ROM correction address 1
```

Write the correction program 1 into the correction program area in the same file.

```
        .section    rom_corre_progmram
        .org        $F200
;
        .blkb       $FEFF-$F200+1   ;area securing
```

Write correction program 1.

```
        .section    rom_corre_program
        .org        $F200
;
RC_PROGRAM1:                        ;ROM correction program 1
        CLB         0,P1
        nop
        nop
        SEB         0,P1
        JMP         $C14E
```

Assemble all the files.
Write the ROM correction vector 1, the ROM correction determination data 1 and the correction program area into the QzROM.

Procdure 4:
Write the JMP instruction to branch to the start address of the correction address 2 into the ROM correction vector 2 in the program file for correction (correct.a74).

```
            .section    rom_corre_vector2
            .org        $F120
;
            .blkb       $20                 ;area securing
```

Write the JMP instruction to the correction program 2.

```
            .section    rom_corre_vector2
            .org        $F120
;
            JMP         RC_PROGRAM2     ;jump to ROM correction program 2
```

Write the ID code 2 and the ROM correction address data 2 into the ROM correction determination data 2 in the same file.

```
            .section    rom_corre_ID2
            .org        $F010
;
            .blkb       6                   ;area securing
;
            .section    rom_corre_addr2
            .org        $F016
;
            .blkb       2                   ;area securing
```

Write the ROM correction determination data 2.

```
            .section    rom_corre_ID2
            .org        $F010
;
            .byte       'M38D24'            ;ID code 2
;
            .section    rom_corre_addr2
            .org        $F016
;
            .word       $C14F               ;ROM correction address 2
```

Additionally write the correction program 2 into the correction program area in the same file.

```
            .section    rom_corre_progmram
            .org        $F200
;
RC_PROGRAM1:                                ;ROM correction program 1
            CLB         0,P1
                :
            SEB         0,P1
            JMP         $C14E
```

Additionally write the correction program 2.

```
            .section    rom_corre_program
            .org        $F200
;
RC_PROGRAM1:                                ;ROM correction program 1
            CLB         0,P1
                :
            SEB         0,P1
            JMP         $C14E
;
RC_PROGRAM2:                                ;ROM correction program 2
            CLB         1,P1
                :
            SEB         1,P1
            JMP         $C155
```

Assemble all the files.
Write the ROM correction vector 2, the ROM correction determination data 2 and the correction program area into the QzROM. Protect the whole area.

5. Sample Programming Code

Download a sample program from the Renesas Technology website.
To download, click “Application Notes” in the left side menu on the page of the 38D2 Group.

6. Reference Documents

Datasheet
38D2 Group Datasheet
Download the latest version from the Renesas Technology website.

Technical News/Technical Update
Download the latest information from the Renesas Technology website.

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REVISION HISTORY	38D2 Group ROM Correction Function (Additional Write Using QZROM)

Rev.	Date	Description	
		Page	Summary
1.00	Feb 09, 2007	–	First Edition issued

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