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Renesas Electronics Corporation

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R8C/25 Group

24-hour Clock Operation Using RTC

1. Abstract

This document describes the program for 24-hour clock using timer RE in real-time clock mode.

2. Introduction

The application example described in this document applies to the following MCU.

- MCU : R8C/25 Group

This program can be used with other R8C/Tiny Series MCUs which have the same special function registers (SFRs) as the R8C/25 Group. Check the manual for any additions and modifications to functions. Careful evaluation is recommended before using this application note.

3. Application Example

Use timer RE in real-time clock mode to operate the 24-hour clock.

Operate timer RE in real-time clock mode and use the periodic interrupt triggered every second to obtain second data (TRESEC), minute data (TREMIN), hour data (TREHR), and day of the week data (TREWK). Use TREWK to update yymmdd. All updated data is written to RAM by BCD code.

In this program, a count starts from 00:00:00, Saturday, September 1, 2007 (initial setting), and operates in 24-hour mode. When the count reaches 23:59:59, December 31, 9999, the count becomes 00:00:00, January 1, 0000.

Settings used in this program are listed in the tables below.

Table 3.1 Timer RE Settings

Function	Setting
Operating mode	24-hour
Periodic interrupt triggered every second	Enable
Real-time clock mode	Enable
Interrupt priority level	1

Table 3.2 System Clock Settings

Function	Setting
XCIN-XCOUT switch	XCIN, XOUT pins
CPU clock	XCIN
System clock	XIN
Low-speed on-chip oscillator	Stop

Figure 3.1 shows the operation flow of this program.

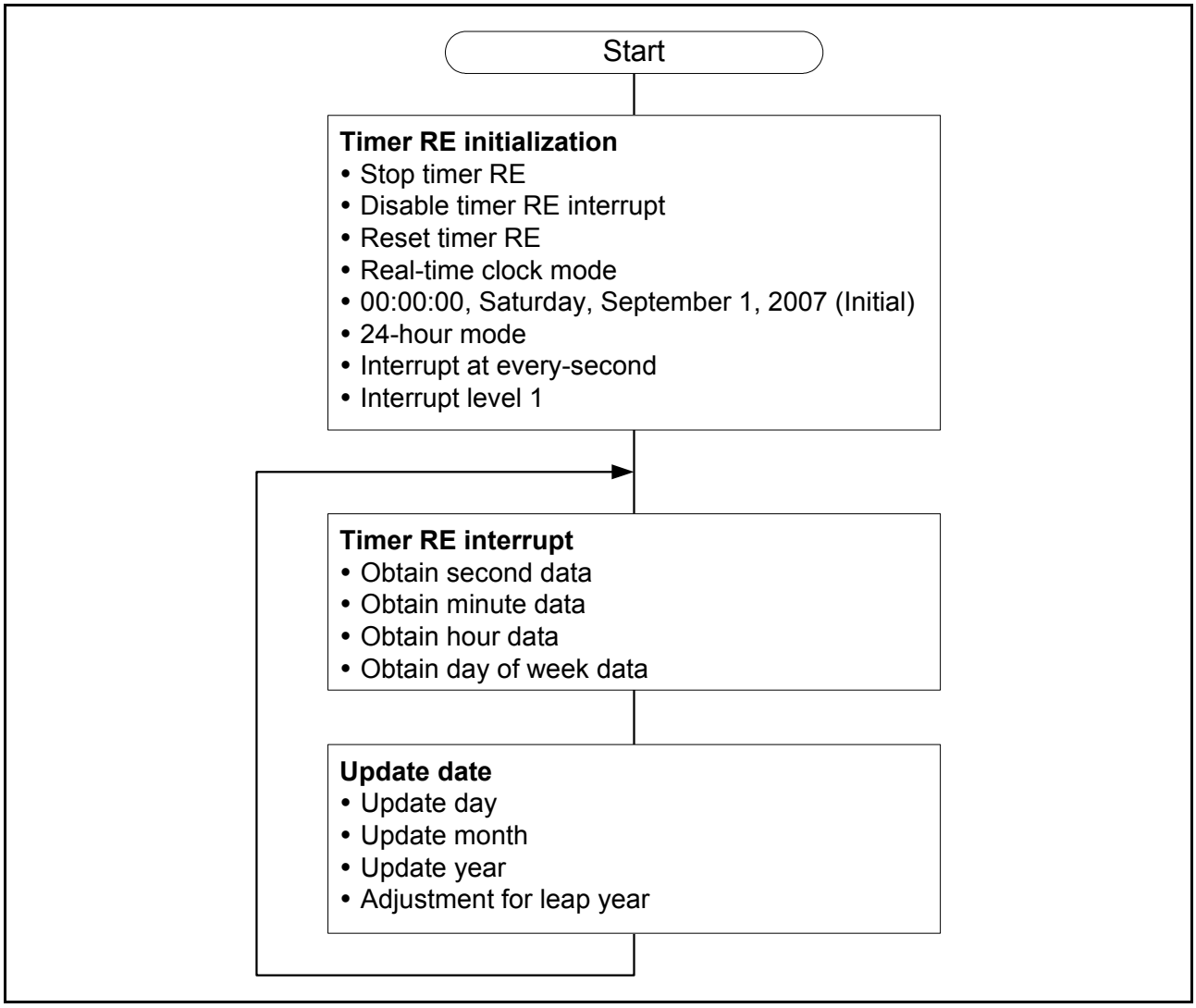


Figure 3.1 Operation Flow

3.1 Memory

Table 3.3 Memory

Memory	Size	Remarks
ROM	565 bytes	In the RTCclock.c module
RAM	19 bytes	In the RTCclock.c module
Maximum user stack	19 bytes	main function: 7 bytes update function: 6 bytes leap_chk function: 6 bytes
Maximum interrupt stack	4 bytes	twint function: 4 bytes

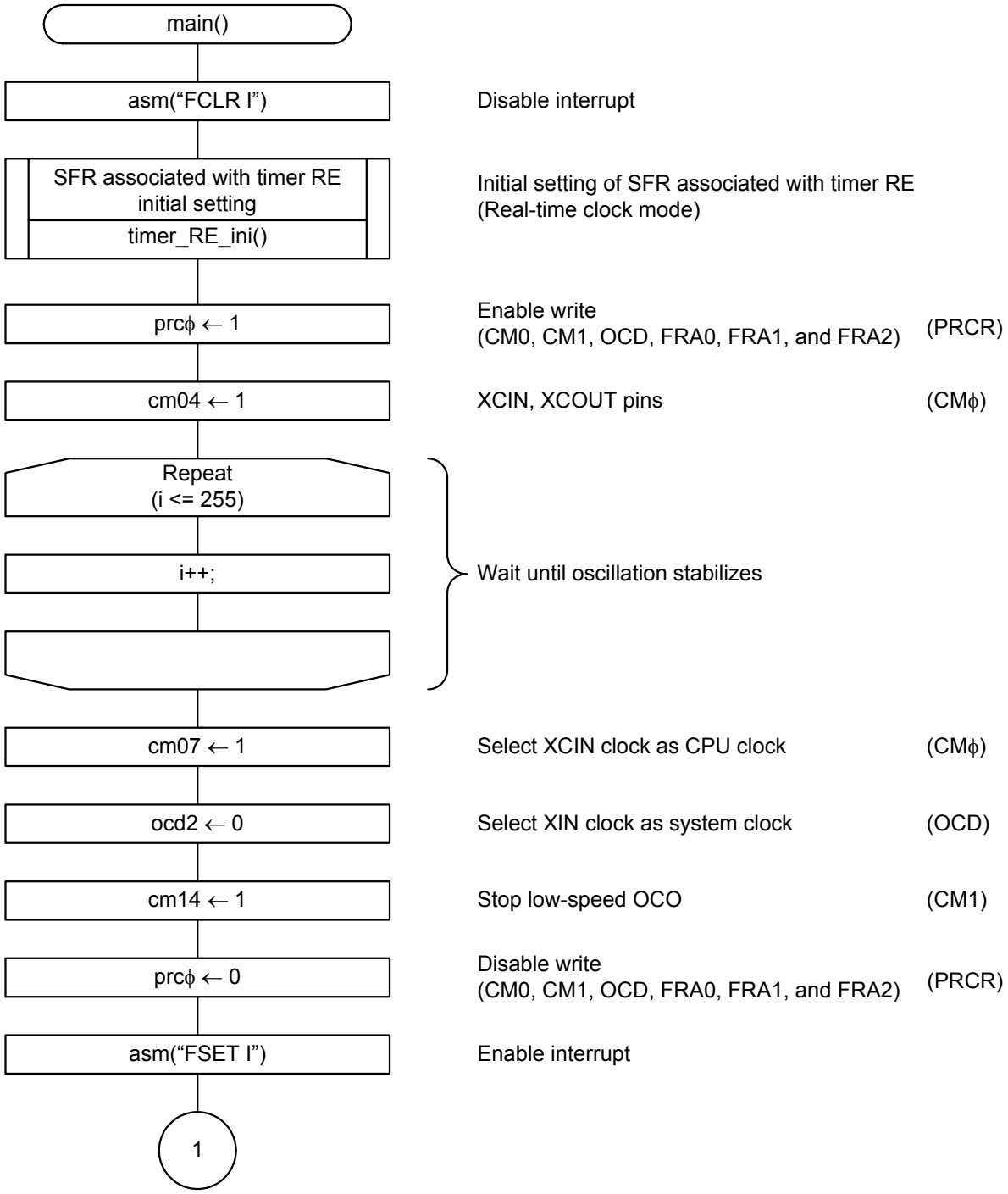
Memory size varies depending on the C compiler version and compile options. They are measured by the following methods:

- ROM: Refer to map file
- RAM: Calculate from source code
- Maximum user stack: Calculate from the value in user stack pointer (USP) register
- Maximum interrupt stack: Calculate from the value in interrupt stack pointer (ISP) register

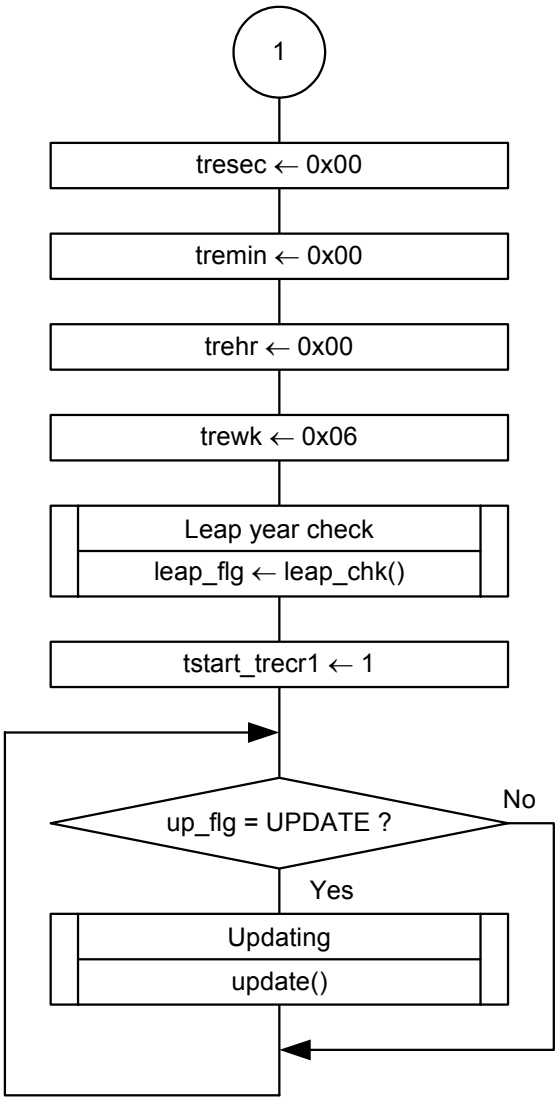
4. Flowcharts

4.1 Main Function

4.1.1 Main Function (1/2)



4.1.2 Main Function (2/2)



Second data initial setting

Minute data initial setting

Hour data initial setting

Day of week data initial setting
(Saturday)

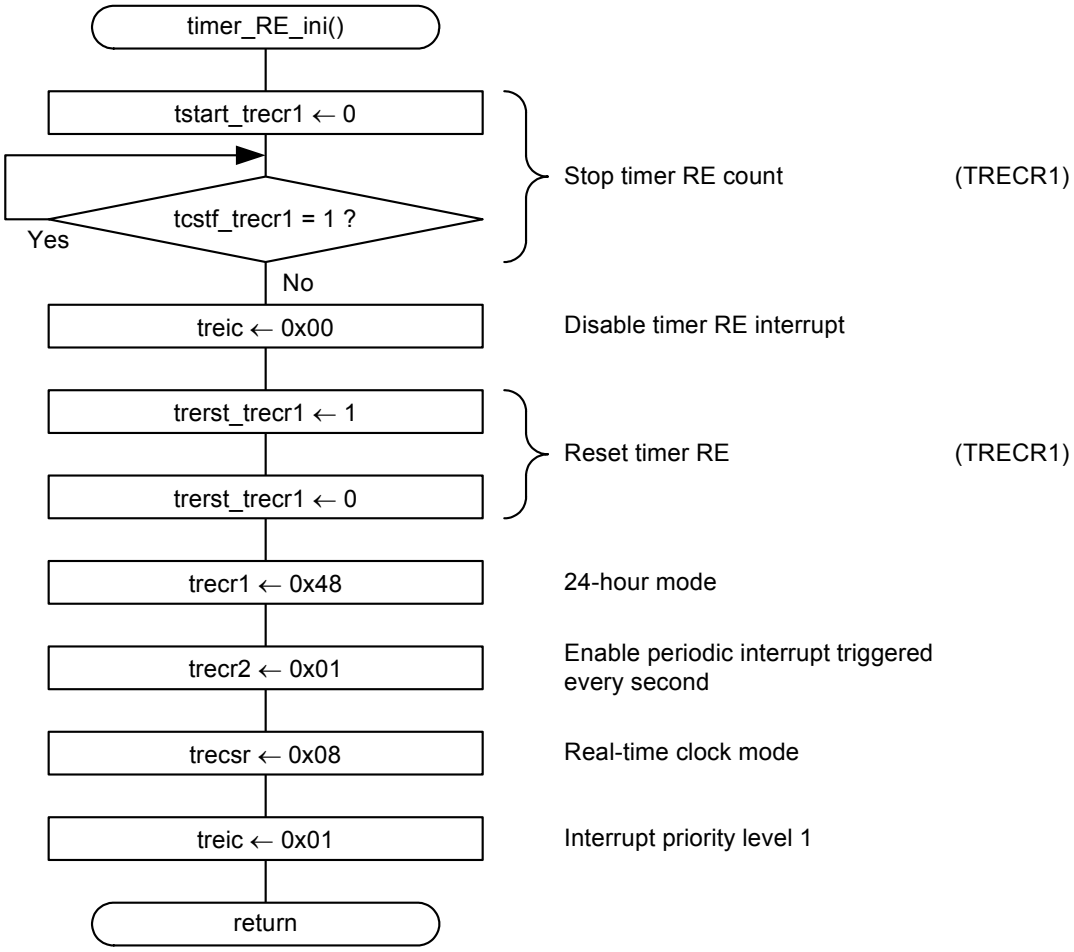
Leap year check

Timer RE count starts (TRECR1)

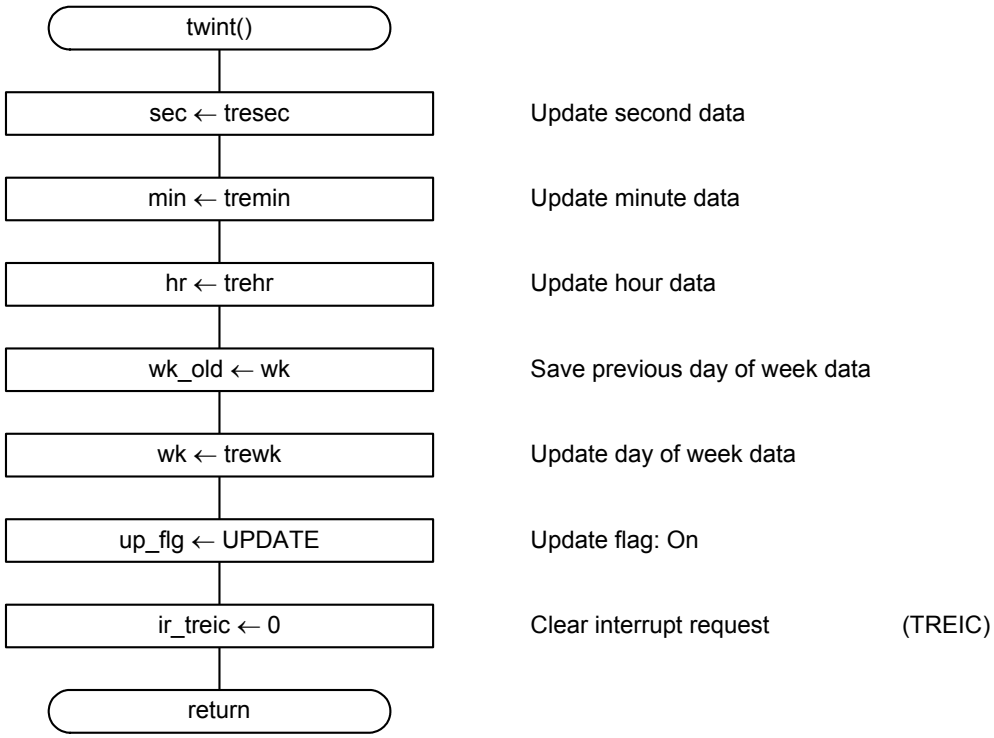
Is there an update?

Updating

4.2 Initial Setting of SFR Associated with Timer RE

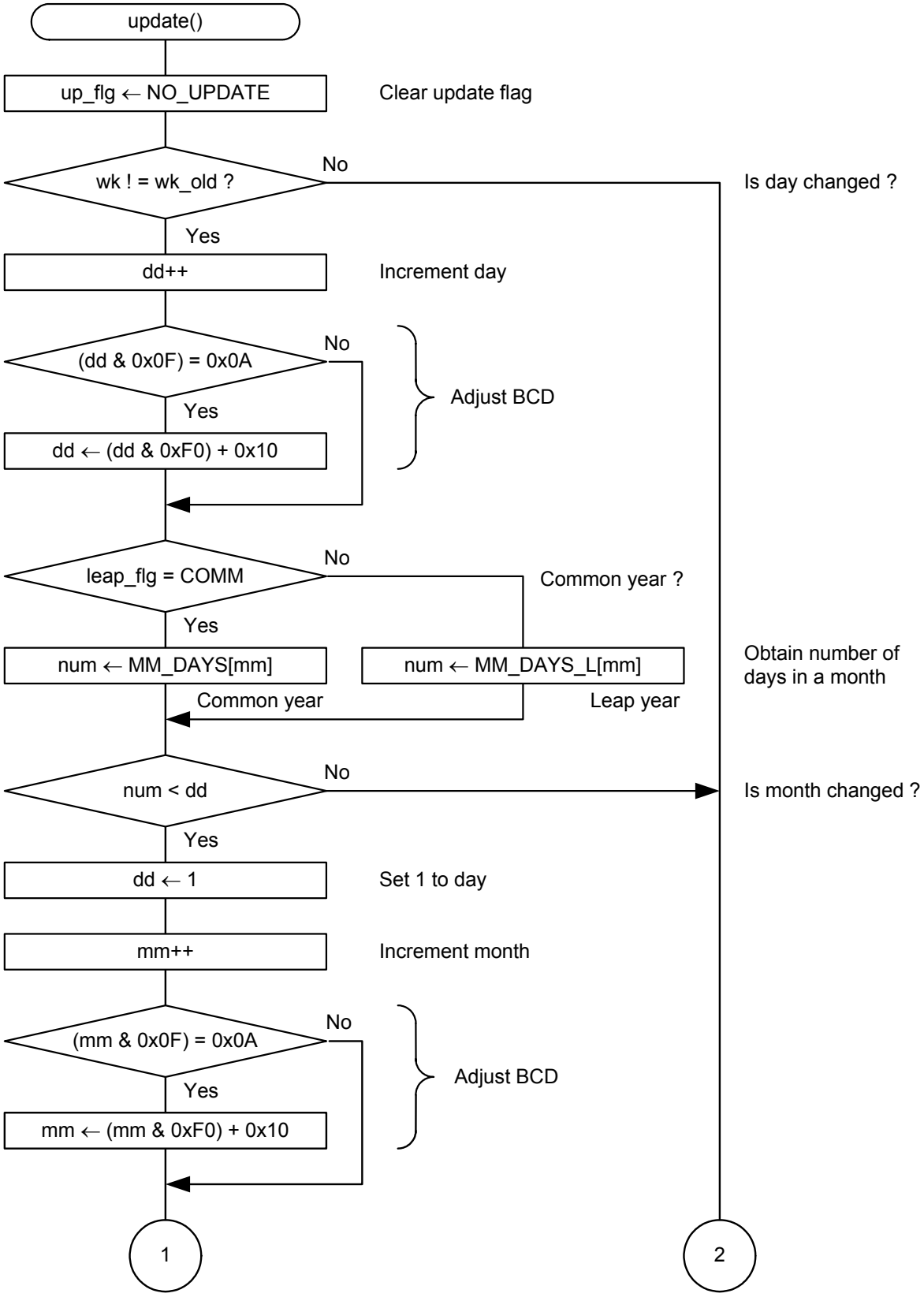


4.3 Timer RE Interrupt

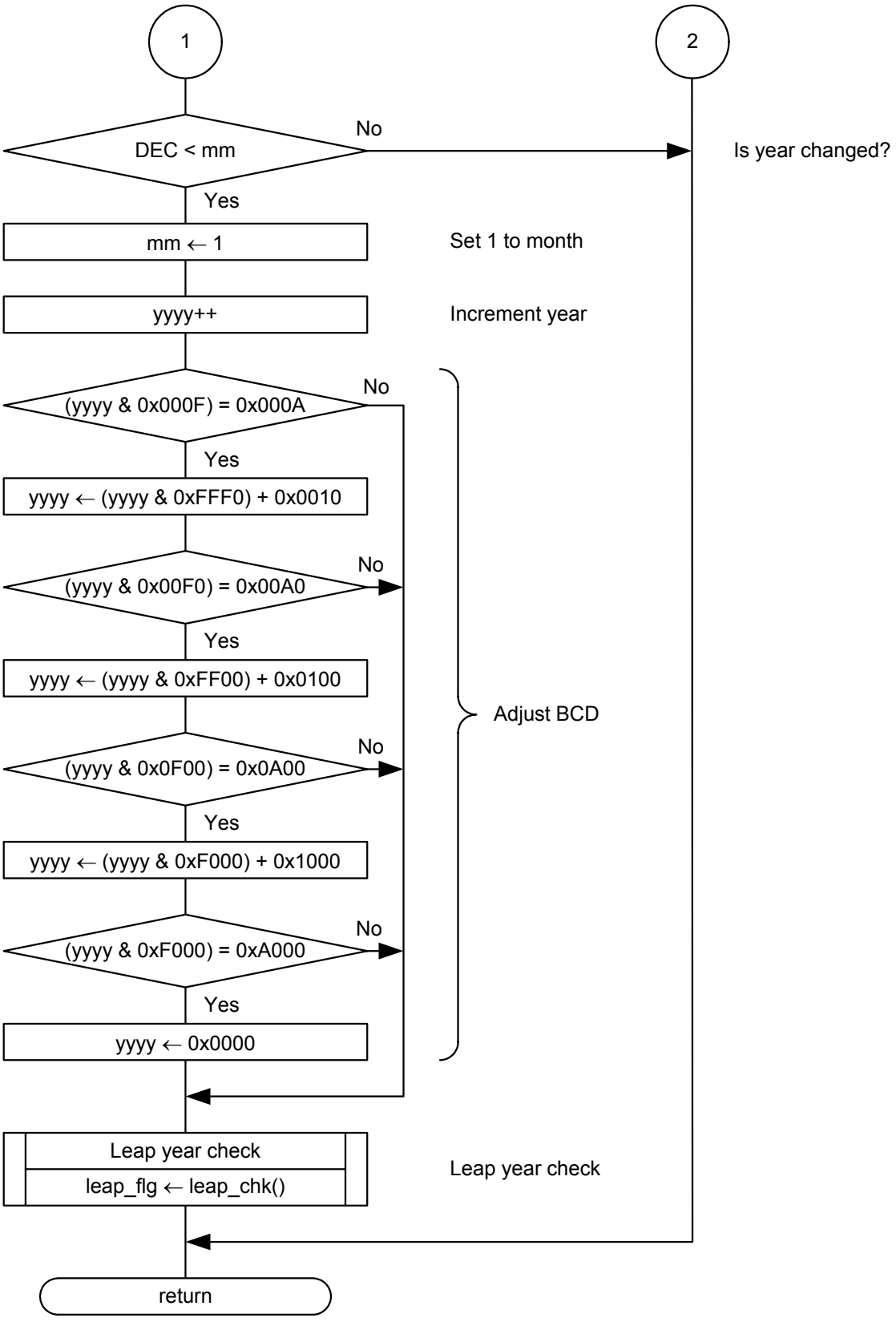


4.4 Updating

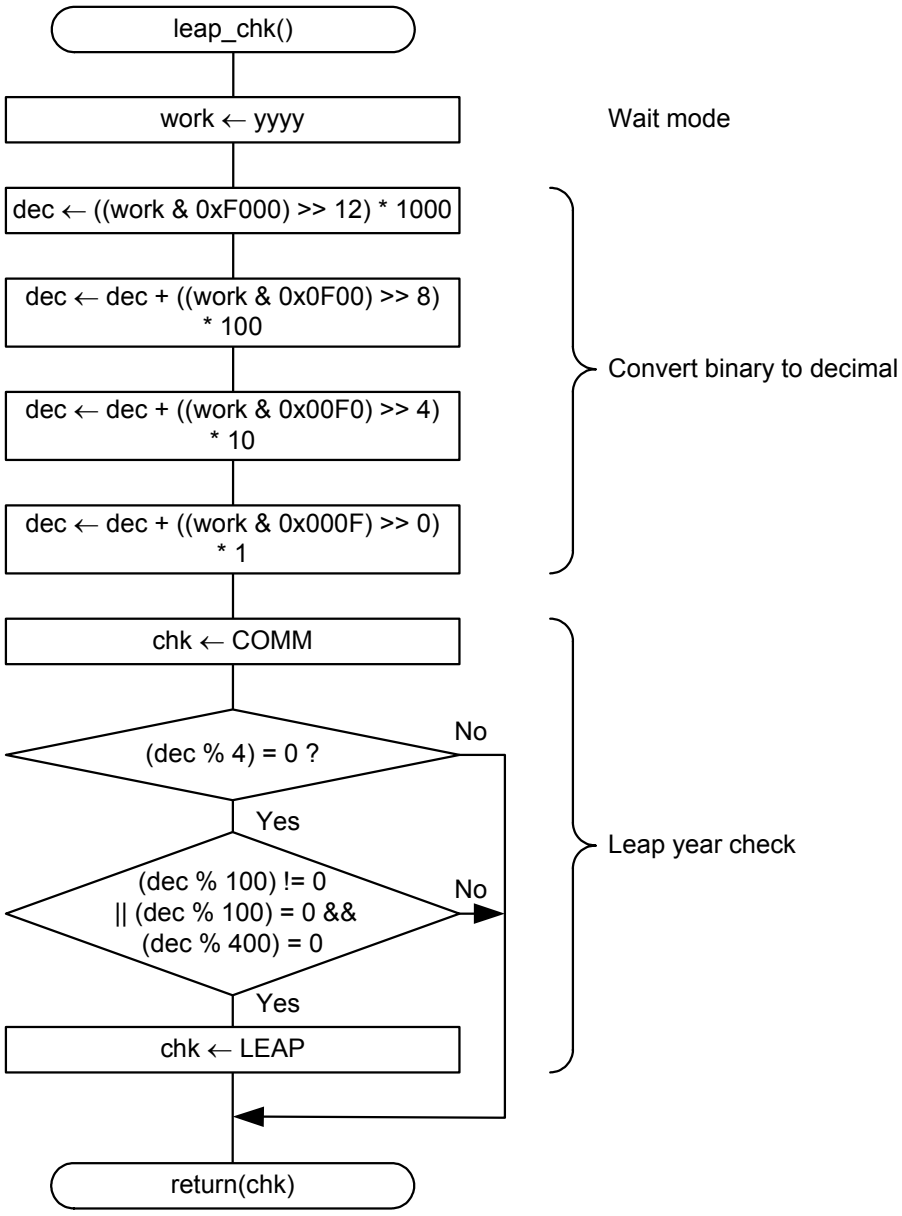
4.4.1 Updating (1/2)



4.4.2 Updating (2/2)



4.5 Leap Year Check



5. Sample Program

A sample program can be downloaded from the Renesas Technology website.
To download, click “Application Notes” in the left-hand side menu of the R8C/Tiny Series page.

6. Reference Documents

Hardware Manual
R8C/25 Group Hardware Manual
The latest version can be downloaded from the Renesas Technology website.

Technical Update/Technical News
The latest information can be downloaded from the Renesas Technology website.

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