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Application Notes

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38K0/38K2 Group
SRA74

Coding Rule a74

Renesas USB Single-Chip Microcomputers

Renesas Electronics
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VER.1.0 2003.06

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Revision History	38K0/38K2 Group SRA74 Coding Rule a74

Rev.No.	Date	Contents
0.0	2001/11/26	Draft issued
1.0	2003/01/31	First edition issued

- **RENESAS** MCU Technical Information
  - http://www.renesas.com/en/usb

- Table of contents -

1.1 Introduction

This document provides instructions for the coding rule of the structured language commands used in the Relocatable Macro-Assembler SRA74 Version 4.00 used with the RENESAS Microcomputer 38K0/38K2 Group USB Sample Firmware.

1.2 File Names

As shown in Table 1.2, files names in the 38K0/38K2 Group Sample F/W are comprised of “prefix + Function Name + file ID”.

Table 1.2 File Name Rule

	Prefix	Function Name	File ID
Source File	p_	A string of words, each starting with an upper-case letter.	Under-bar + contents described in 3 lower-case letters
Include File	h_		

(1) Prefix

The file name is headed by a prefix that indicates the type of the file. Program files are indicated with a **lower-case “p” followed by an under bar**, include files are indicated with a **lower-case “h” followed by an under bar.**

(2) Function Name

The function name is defined by a string of words, each of which the first letter is upper-case, and all other letters are lower-case.

Example: “ChargeIndication” would represent the function name for the charge indication.

(3) File ID

At the end of the file name is the file ID, indicating the file in which the module routine (program routine) is stored. The ID is preceded by an **under-bar and consists of three lower-case letters**.

Example: the file ID for the charge function would be **“_cha”**.

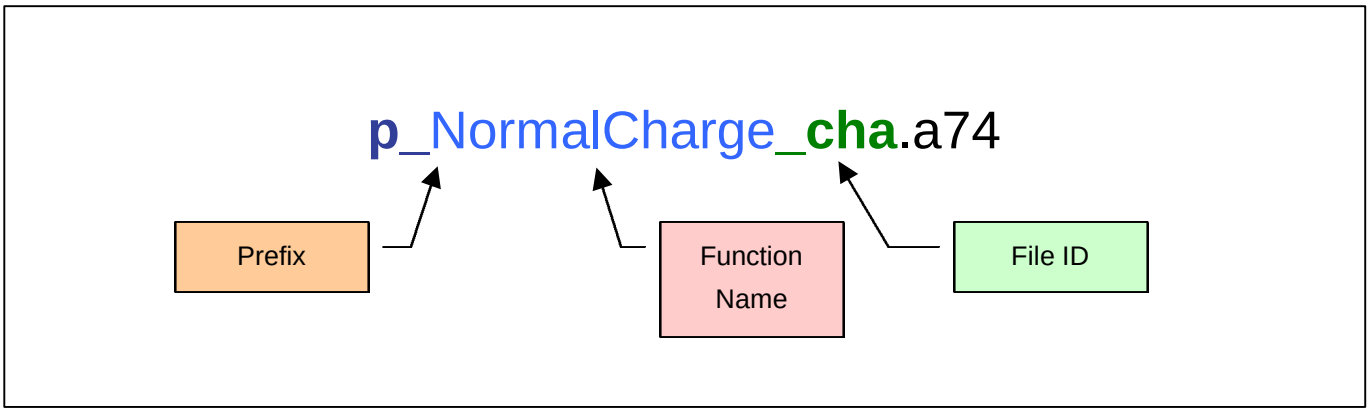

Figure 1.2 Denomination Example of File Name

1.3 Include Files for 38K0/38K2 Development

Table 1.3 lists definition examples of include files used for 38K0/38K2 Group developments.

Table 1.3 Definition Examples of Include Files for 38K0/38K2 Group Developments

File Name	Include Destination File	Description
h_Section.inc	Main only	Assigns sections of address space and specifies the start address.
h_INT_vec.inc	Main only	Gets the interrupt start address externally and stores address in interrupt vector area (FFDCH – FFFFH).
h_Assem_con.inc	All	Configure assembly condition of F/W. The configuration can be changed by rewriting this file.
h_Const_def.inc	All	Sets constant definition for F/W.
h_SFR_sym.inc	All	Defines SFR symbol names in area 0000H-003FH(synonymous definition).
h_RAM_pub.inc	All	Labels (area reservation and variable name definitions), defines symbols, and makes public declarations for RAM variables.
h_ROM_dat.inc	Main only	Defines the ROM data.

(1) h_Section_inc

This file sections off address space in the RAM and program areas and defines the section names. Because the address space is assigned only once during the assemble, this file should only be included in the main file (multiple include files will cause duplicate definitions during the link).

(2) h_INT_vec.inc

This file stores the start address of the interrupt that jumps to the interrupt vector area (ROM). Assign an external reference to the start address of the interrupt process (subroutine label) and store the address in word units (pseudo instruction (".WORD"). Because the address is stored only once during the assemble, this file should only be included in the main file (multiple include files will cause duplicate definitions during the link).

(3) h_Assem_con.inc

This file sets the assembly condition to be modified by the firmware. Set the applicable function to "1" and all other functions to "0" for the assemble. Because the assembler pseudo instruction for this file is "=(EQU)" (a simple macro replacement instruction for compile), this file must be included in all applicable program files.

(4) h_Const_def.inc

This file is for setting the constants used by this firmware. Part of this file interlocks with "h_ROM_dat.inc". Therefore, rewriting this file will cause the ROM data to be modified as well. In addition, as part of this file is used for the assembly condition, you must be careful when erasing or changing definition names. Because the assembler pseudo instruction for this file is "=(EQU)" (a simple macro replacement instruction for the compile), this file must be included in all applicable program files.

(5) h_SFR_sym.inc

This file defines symbols for the SFR area. This file uses assembler pseudo instructions that start with "=(EQU)" (instruction that performs a macro-conversion during the compile). Therefore, the file must be included in all applicable program files.

(6) h_RAM_pub.inc

This file defines the labels for the RAM variables (block reservation and variable name definition) and global declarations. Include this file in all requesting program files. Make sure "synonymous absolute attribute section overlap enable – A" is enabled (active) in the linker options (if the overlap is disabled, definitions will be duplicated during the link).

(7) h_ROM_dat.inc

This file defines the ROM data and issues the global declaration. When using ROM data, set the program file address (ROM data start address) to an external reference. ROM data is only stored once during the assemble, so only include this file in the main file (multiple include files will cause duplicate definitions during the link).

1.4 Labels

A label identifies an address space. Labels with the same name reference the same address during a link. The RAM variable is also one type of label. This firmware is configured to reference the label address of the RAM variable.

The label address is not assigned at the assemble stage, but assigned for the first time during the link (relocatable = re-assignable). The same address will be assigned to files with the same global label name. A different address will be assigned to each address space indicated by a local label.

1.4.1 ROM Label

As shown in Figure 1.4.1, this coding rule specifies two types of ROM labels: ROM label which stores the program (code) and the ROM label that stores the data.

(1) Prefix

The prefix defines the contents of the ROM area (relocatable) address. The prefix for a program address (global label) is an upper-class “P” followed by the under bar. The prefix for a special area address is upper-class “SP” followed by the under bar. The jump destination address (local label) does not include a prefix.

(2) Function Name

The function name in the ROM address is as follows:

Program address (global label) – each word in the name starts with an upper-case letter and is followed by lower-case letters.

Jump address (local label) – all upper-case letters

(3) File ID

The file ID is added at the end of the address and indicates the file in which the module routine (program file) is stored. The jump destination address does not include a file ID

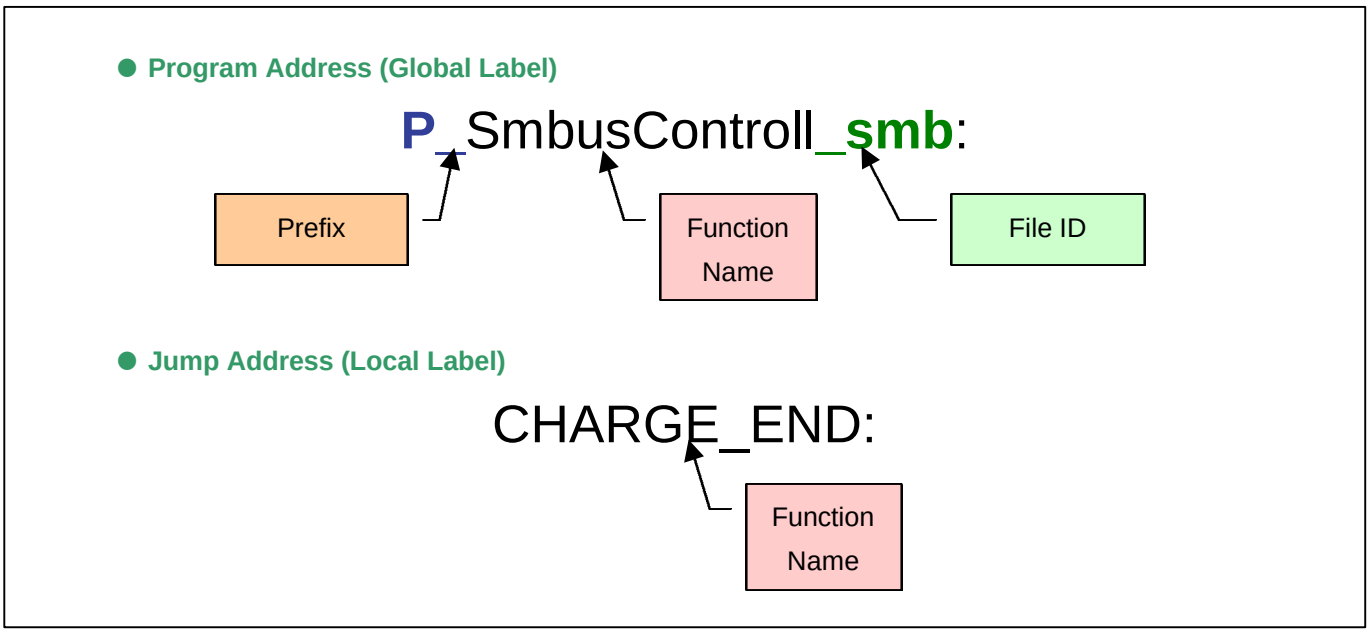

Figure 4.1 Denomination Example for ROM Label

1.4.2 SFR/RAM Labels

As shown in Figure 1.4.2, this coding rule specifies two types of variables: SFR label and the RAM data label.

(1) Prefix

The prefix for an SFR area (variable) is an upper-class “S” followed by the under bar. The prefix for 0 page is an upper-class “Z” followed by the under bar. All other pages are defined with an upper-class “O” and the under bar. However, industry standard variables, such as those defined in the USB specification, use the name of the variable as is.

(2) Function Name

The function name for SFR areas is written according to the manual. All other areas, other than industry standard areas, are written in all upper-case letters.

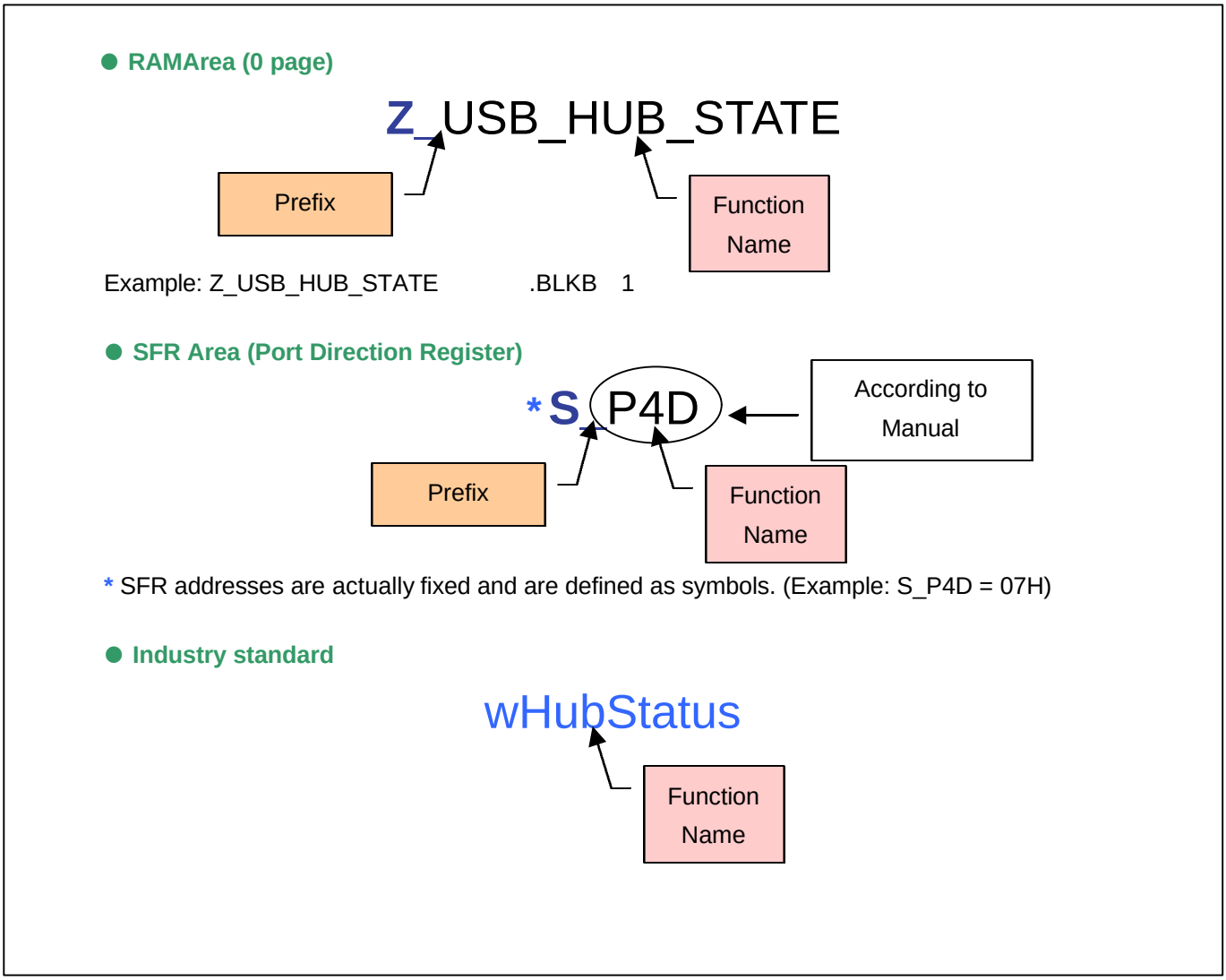

Figure 1.4.2 Denomination Example of SFR/RAM Label

1.5 Symbols

Symbols accommodate the occurrence of synonymous definitions. Symbols on the left side of ".EQU" are replaced with symbols (including numerical values) on the right during the SRA74 assemble.

(1) Prefix

The prefix for the symbol defines the contents of the address. The prefix for a fixed symbol is an upper-case "N" followed by the under bar. The prefix for a bit symbol is a lower-class letter, as shown in Table 1.5. However, word symbols, such as READ and WORD, do not have prefixes.

Table 1.5 Bit Prefix

Bit Prefix: area display	
s	SFR area
z	0 page area

(2) Function Name

The function name for a bit symbol is indicated in all upper-case letters, while the name for a fixed symbol can be indicated in either upper or lower-case letters.

(3) Alternative SFR Value

The alternative value for the SFR is conveniently defined by an upper-class "N", the under bar, and the SFR symbol

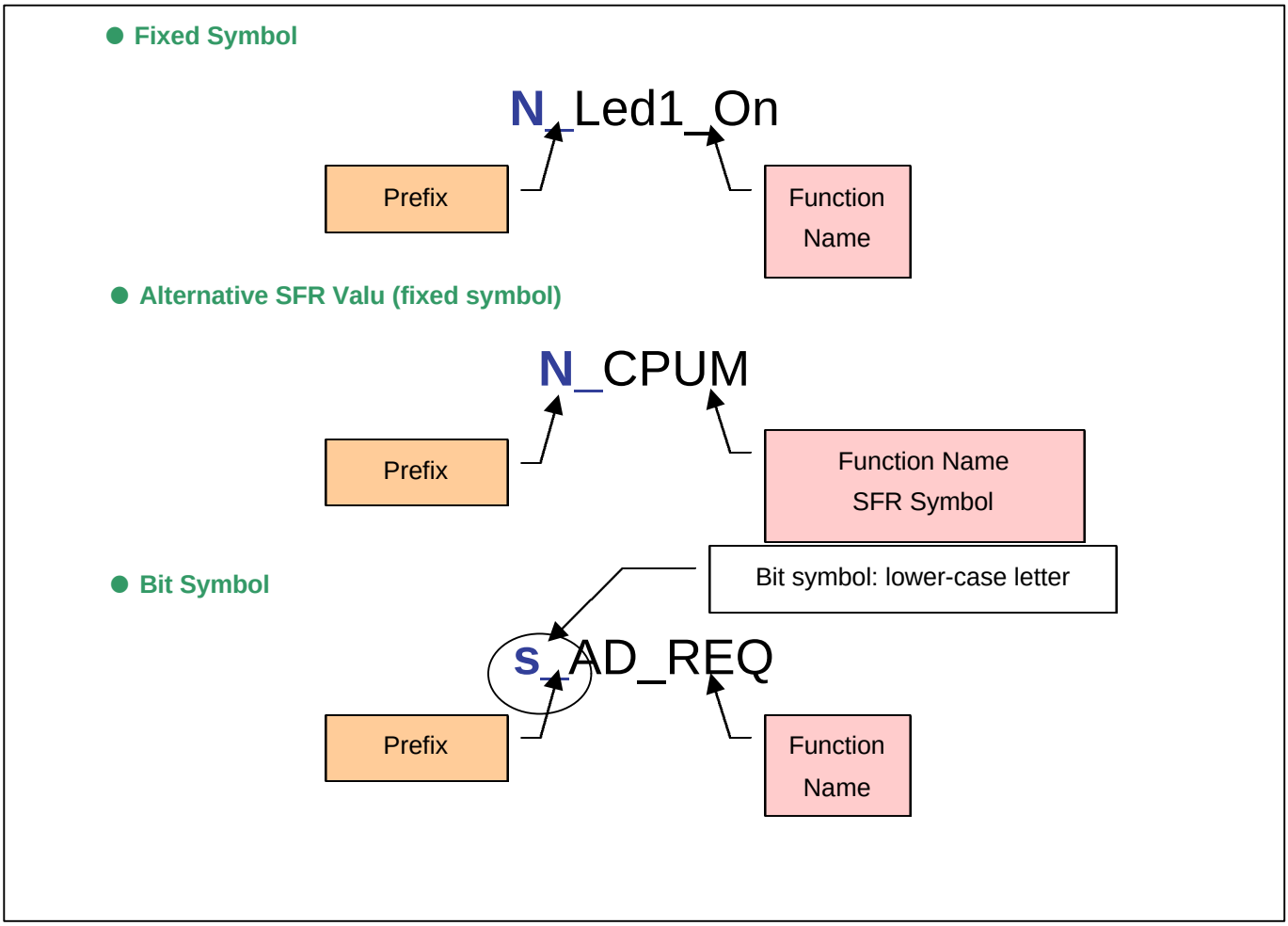

Figure 1.5 Denomination Example of Symbols

1.6 Miscellaneous Rules

[1] The mnemonic for assembler is indicated in all upper-case letters (LDA, STA).

[2] Structured language commands are described in all lower-case letters (if [ ]…endif).

[3] Pseudo instructions are indicated in all upper-case letters (INCLUDE .IF… .END). Pseudo instructions are for assembler and linker and do not affect the firmware.

1.7 Important Notes

The SRA74 structured language command cannot describe “else if”. Therefore, “else” and “if” must be described on separate lines.

Examples:

[Unacceptable]

```
    if A == 0
      Process 1
x → else if X == 1
      Process 2
    else
      Process 3
    endif
```

[Acceptable (1)]

```
if A == 0
   Process 1
else
     if X == 1
    Process 2
 else
     Process 3
 endif
endif
```

[Acceptable (2)]

```
if A == 0
   Process 1
   JMP END
endif
if X == 1
   Process 2
   JMP END
endif
Process 3
END:
```

Figure 1.7 SRA74 Examples of Description Restrictions

For more details concerning file description rules, refer to the USB Sample Firmware.

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