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User's Manual

SH7619 CPU Board M3A-HS19G50

Installation Manual

Renesas 32-Bit RISC Microcomputers
SuperH™ RISC engine Family/SH7619 Group

Renesas Electronics
www.renesas.com

Rev.1.00 2008.07

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⚠ CAUTION	If the product is improperly handled without regard for this indication, there will be a possibility of inflicting an injury on persons or physical damage.
IMPORTANT	Indicates other important information to be observed when using the product.

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The △ mark indicates a warning or caution.

Example: Be Careful About Electric Shock

The ⃠ mark indicates a prohibition.

Example: Do Not Disassemble

The ● mark indicates a compulsory or directive instruction.

Example: Unplug from Socket

Important

Before using this product, be sure to read this manual (Installation manual) carefully. Keep this manual, and refer to this when you have questions about this product.

About this product:

The term “this product” referred to here mean the product manufactured by Renesas Technology Corporation.
It does not include the user systems and host machines of the customers.

Purpose of use of this product:

This product is developed for only providing users with experience on the specifications and the development environment of the SH7619 MCU, Renesas 32-bit RISC MCU SuperH RISC engine family. Be sure to use this product correctly according to said purpose of use. Avoid using this product for other than its intended purpose of use.

For those who use this product:

This product can only be used by those who have carefully read the user’s manual and know how to use it. To use this product, the basic knowledge of electric circuits, logical circuits, and MCUs are required.

When using this product:

(1) This product is a development supporting unit for use in your program development and evaluation stages.
In mass-producing your program you have finished developing, be sure to make a judgment on your own risk that it can be put to practical use by performing integration test, evaluation, or some experiment else.
(2) In no event shall Renesas be liable for any consequence arising from the use of this product.
(3) This product has been developed by assuming its use for program development and evaluation in laboratories. Therefore, it does not fall under the application of Electrical Appliance and Material Safety Law and protection against electromagnetic interference when used in Japan.
(4) Renesas cannot predict all possible situations or possible cases of misuse where a potential danger exists. Therefore, the warnings written in this manual and the warning labels attached to this product do not necessarily cover all of such possible situations or cases. Be sure to use this product correctly and safely on your own responsibility.
(5) This product is designed for use in program development and evaluation stages. It cannot be embedded in your product for mass-production purposes.
(6) Even if this product has a defect in its MCU, it will not be replaced with a product which has had the MCU defect corrected.
(7) No parts incorporated in this product may be dismantled for diverted use in other products.
(8) When the MCU is mounted into a socket, it is likely to become a loose connection by the vibration and the shock for the CPU board. In this case, install IC again and tighten the screw.

Usage restrictions:

This product has been developed as a means of supporting system development by users. Therefore, do not use it as a device used for equipment-embedded applications. Also, do not use it for developing the systems or equipment used for the following purposes either:

(1) Transportation and vehicular

(2) Medical (equipment where human life is concerned)

(3) Aerospace

(4) Nuclear power control

(5) Undersea repeater

If you are considering the use of this product for one of the above purposes, be sure to consult Renesas Technology, Renesas Solutions, Renesas Technology Sales or your distributor.

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About figures:

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Chapter 1
Introduction

1.1 Overview

M3A-HS19G50 (hereinafter called this “product”) consists of a CPU board (part number: M3A-HS19) and a sample software. This installation manual describes mainly how to set up the M3A-HS19 hardware and software. For details on the SH7619 hardware and programming manual, refer to the manuals in the CD-ROM attached with this product.

If any of above items is missing or damaged, please contact Renesas Technology Corporation, Renesas Solutions Corporation, or Renesas Technology Sales Co., Ltd. or its distributor.

To Ensure Safe and Correct Use
Safety precaution: ● This manual uses various pictorial indications to ensure the correct use of the product and thereby prevent inflicting an injury on users or other people or causing damage to property. ● These pictorial indications are explained in Section 1.2, “Usage Precautions.” Please be sure to understand the contents written in that section before you use the product.

1.2 Usage Precautions

The precautions described here must be observed in order to prevent inflicting an injury on users or other people or causing damage to property, and to ensure that this product is used safely.
To ensure the correct use, be sure to read these precautions, and understand the written contents before you use the product. Not all precautions described in this manual relate to the Renesas product alone, some of them apply to an entire personal computer system incorporating the Renesas product also.

The following explains the warnings and cautions indicated for the handling of this product.

➢Warning Indication

⚠ WARNING
Regarding the handling of this product: ● Do not use this product outdoors. It can only be used indoors. ● Do not let foreign matter such as water, pieces of metal or inflammable material get into the board or connectors.
Regarding installation: ● Do not install the product in humid or wet places. Should water get into the internal circuit of the product, an unrecoverable fault may result.
Regarding the working environment: ● The upper-limit ambient temperature at which this product can be used (i.e., rated maximum temperature) is 50°C. Make sure this rated maximum temperature is not exceeded.

➢Caution Indication>

CAUTION
Regarding the reconstruction of this product: ● Do not reconstruct this product. If the product has gotten out of order for reasons of disassembly or reconstruction, requests for repair may not be accepted.
Regarding the handling of this product: ● Handle this product with caution, not to let it drop or fall down or apply strong mechanical shock. ● Do not touch the communication interface connector pins or other connector pins directly with your hand. The internal circuit may be broken by static electricity. ● When moving this product to another place of installation, be careful not to apply strong vibration or mechanical shock to it. ● After connecting each piece of equipment with cable, check the cables again to see that they are connected correctly. For details on how to connect, refer to Chapter 2, “Setting Up the Hardware.” ● Before turning on the power for each connected piece of equipment, make sure you’ve finished connecting all cables. Do not connect or disconnect any cable when the power is turned on.
Regarding the operating procedure for this product: Note ● Exceptional conditions or precautions are noted in an operation procedure or explanatory description when it is necessary to call the user’s attention.

1.2.1 Symbols Used

Table 1.2.1 lists the symbols used in this manual.

Table 1.2.1 Symbol List

Symbol	Description
[Menu->Menu Option]	“->” is used to indicate menu options. Example: [File] -> [Save As]
“File name” “Directory” “Button"	" … " is used to indicate file names, directory, or button of a dialog box. Example :"C:¥Sample_softwawe¥fmtool_hs19" "OK" button "resetprg.c"

1.3 Installation Procedure

In this manual, follow the procedure indicated in Figure 1.3.1 to install the M3A-HS19G50.

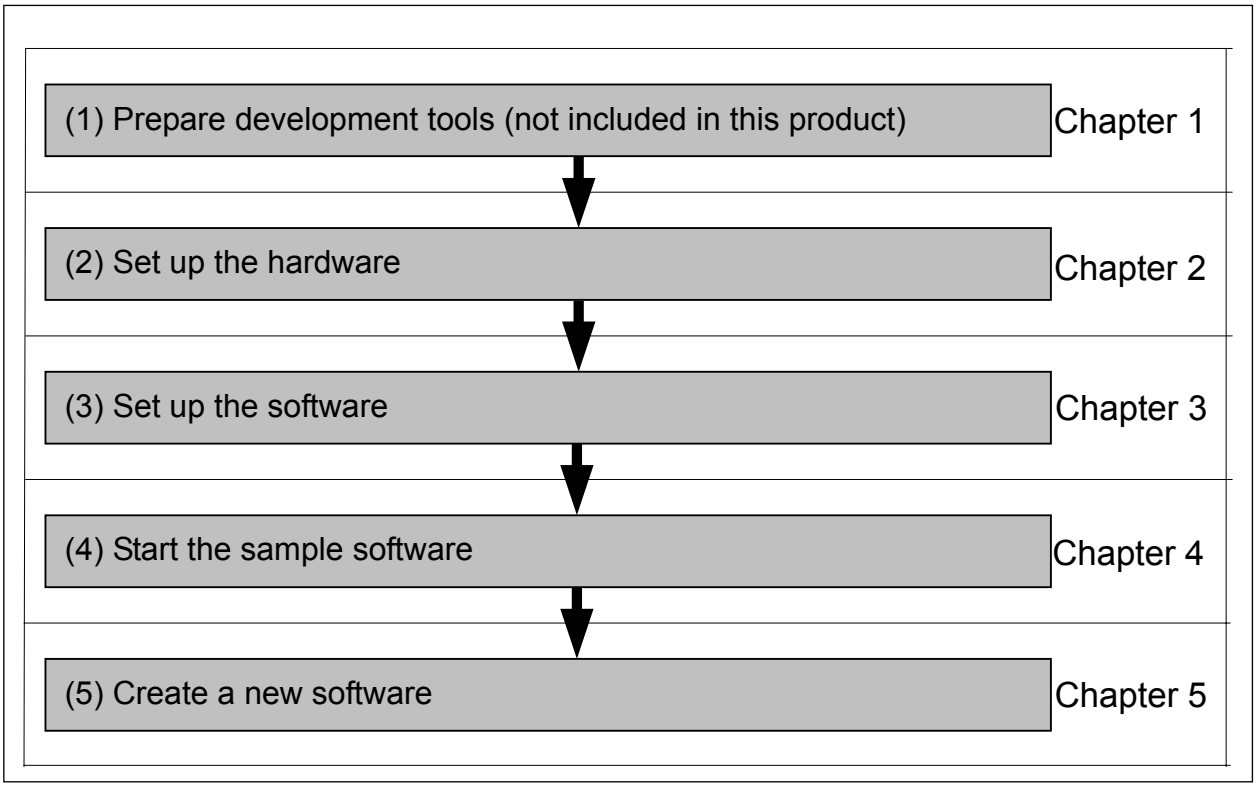

Figure 1.3.1 M3A-HS19G50 Installation

1.4 Operating Guarantee for This Product

This product (hardware and software) was developed for only providing user with experience on the specifications and development environment of the SH7619 MCU, and does not guarantee the results arising from the use of this product.

To use this product, the type of host computer is specified for its operating environment (IBM PC/AT and its compatible). However, it only indicates the operating environment assumed by Renesas, and does not guarantee that the M3A-HS19 CPU board operates normally in all relevant types of machines or in all relevant environments (e.g., device driver and peripheral device).

1.5 What You Need to Get Started (Not included in this product)

Following items are not included in this product and should be prepared by user.

<For the M3A-HS19 CPU Board>

Prepare following power supply in order to supply power to the M3A-HS19 CPU board.

Table 1.5.1 Power Supply (For the M3A-HS19 CPU Board)

No.	Item	Remarks
1	5 V DC output regulated power supply	1.5 A min.

<For the Development Environment>

This manual describes how to install this product using the Renesas development tools.

To install this product as described in this manual, prepare following Renesas development tools.

Table 1.5.2 Renesas Development Tools

No.	Item	Part number	Applicable Version
2	E10A-USB Emulator for SuperH RISC engine Family	HS0005KCU01H or HS0005KCU02H	Supports the SH-2 device Group
3	SuperH RISC engine C/C++ Compiler Package	R0C40700XSW09R	Ver.9.01 Release01 or later
4	Integrated development environment tool High-performance Embedded Workshop	-	Ver.4.03.00 or later

Notes:
• If you already have the E10A-USB emulator and are using any MCUs other than the SH-2 group, purchase a license tool for device group additions to use additional MCUs (not included in this product).

• For details on how to setup a new device group in the E10A-USB Emulator, refer to section 3.2.2, Set up the E10A-USB Emulator in this manual.

1.5.1 Recommended Host Computer Environment

Followings are the recommended operation environment to use the above Renesas development tools

Table 1.5.3 Operating Environment for the Renesas Development Tools

Host Computer Specifications	IBM PC/AT Series or its Compatibles
CPU	IBM PC or its compatible machine with Pentium III or later (600 MHz or higher recommended) and USB port compliant to USB 1.1/2.0 port (full-speed)
Memory	128 MB or more (at least twice of the load module size recommended)
Hard disk	Installation requires 100 MB or more of hard disk capacity. (To reserve the swap area in the hard disk, at least twice of the memory size must be available. Four times or more recommended.)
OS	Windows 98 SE, Windows Me, Windows 2000, Windows XP

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Chapter 2
Setting Up the Hardware

2.1 The M3A-HS19 and the E10A-USB Emulator Configuration

Figure 2.1.1 shows the configuration of the M3A-HS19 CPU board and the E10A-USB emulator.

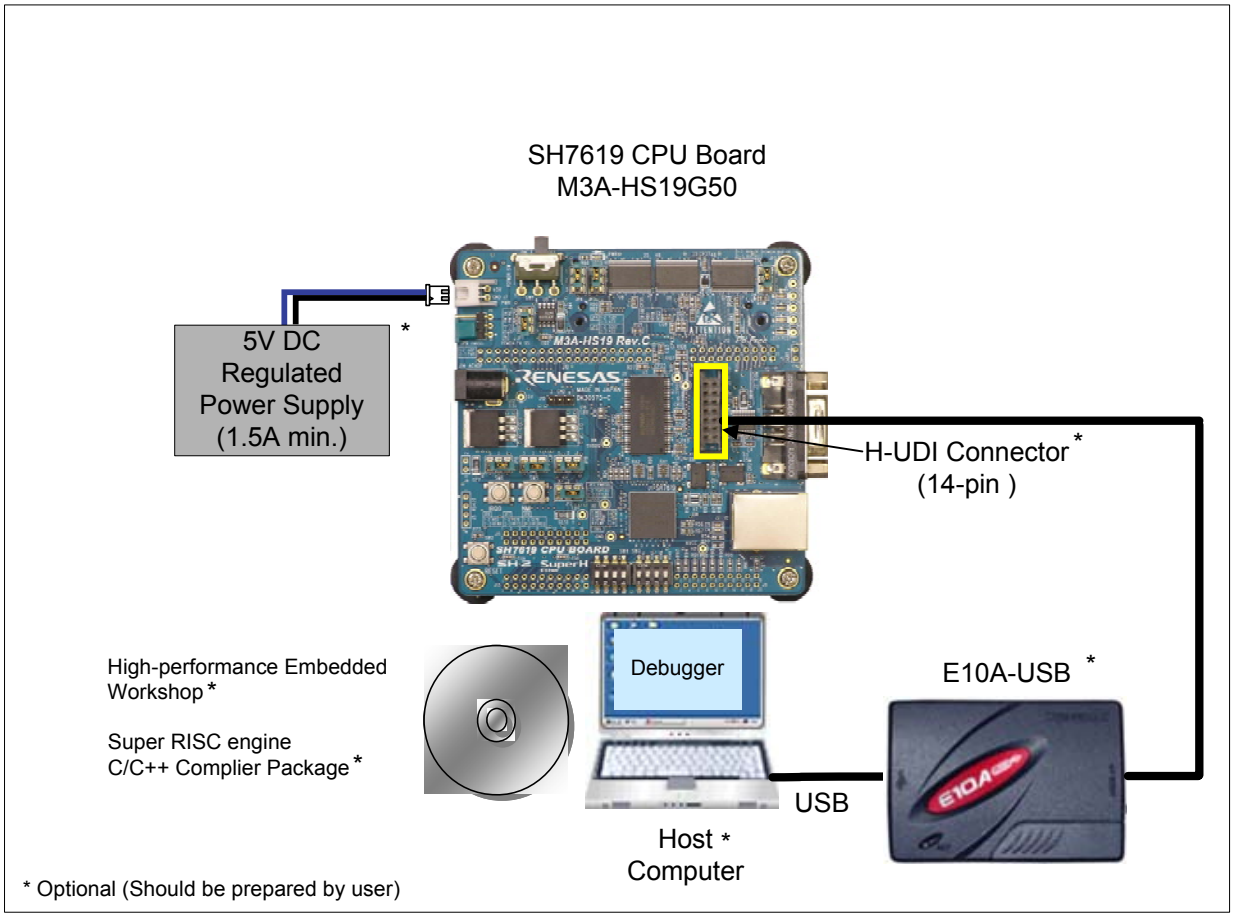

Figure 2.1.1 M3A-HS19 and E10A-USB Emulator Configuration

2.2 Switch Setting

Following describes the M3A-HS19 switch setting.

CAUTION

- Do not change DIP switches and jumper settings while the M3A-HS19 is operating. Always be sure to turn off the power before changing DIP switches or jumper settings. This is necessary to prevent unrecoverable damage to the M3A-HS19 that may otherwise occur.

2.2.1 M3A-HS19 DIP Switches Setting

To use the M3A-HS19 CPU board as described in this manual, be sure to set the DIP switches (SW4) to the default setting as shown in Figure 2.2.1 and Table 2.2.1.

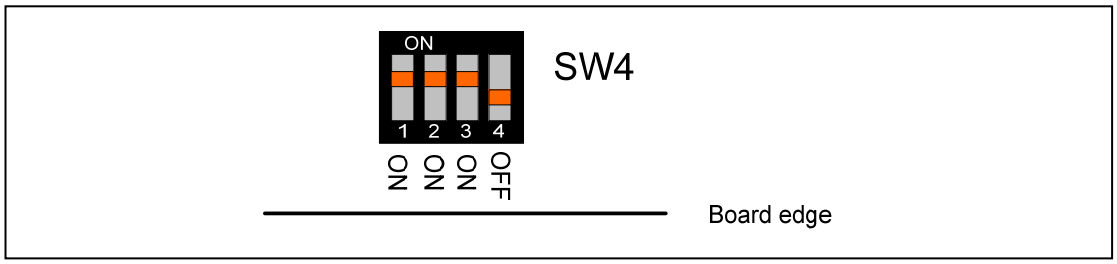

Figure 2.2.1 DIP Switches Setting

Table 2.2.1 DIP Switches Setting (SW4)

Switch no.	Function	Default	Description
SW4-1	System setting	ON	Big endian (MSB FIRST)
SW4-2	Reserved	ON	Always ON
SW4-3	Reserved	ON	Always ON
SW4-4	Flash memory	OFF	Flash memory is write-enabled.

2.2.2 M3A-HS19 Jumper Switch Setting

To use the M3A-HS19 CPU board as described in this manual, be sure to set the jumpers to their default setting as shown in Figure 2.2.2 and Table 2.2.2.

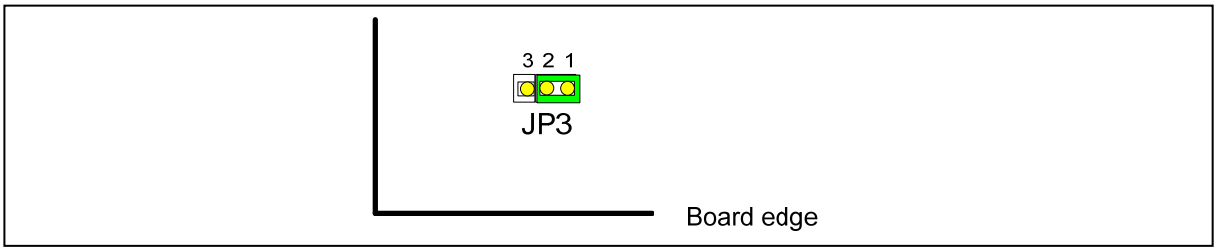

Figure 2.2.2 Jumper Setting

Table 2.2.2 SH7619 Group Power Switching Jumper Settings (JP3)

No.	Default	Description
JP3	1-2	1.8 V supplied from the regulator (supplied from U16)

2.3 System Configuration and Power-on

Be sure to turn OFF the host computer, and not to connect the E10A-USB emulator and the host computer by a USB cable. Then, follow the procedure below.

1. Attach the user interface cable to the connector on the target side of the E10A-USB emulator.
2. Attach a USB cable to the connector on the host side of the E10A-USB emulator.
3. Turn on the host computer (Start the operating system).
4. Turn on the M3A-HS19 CPU board.

2.4 Disconnect the System Power Supply

Follow the procedure below to disconnect the system power supply.

1. Disconnect the E10A-USB emulator from the High-performance Embedded Workshop.
2. Turn off the M3A-HS19 CPU board.
3. Exit the High-performance Embedded Workshop, and turn off the host computer.

CAUTION

- Unless the above power-on sequence is followed, unrecoverable damage may occur to the M3A-HS19 or the E10A-USB emulator or both.

Chapter 3
Setting Up the Software

3.1 About the High-performance Embedded Workshop

The High-performance Embedded Workshop is an integrated development environment with a graphical user interface to simplify the development and debug of applications written in C/C++ and assembly languages for Renesas MCUs. Software development on the M3A-HS19 is carried out by the High-performance Embedded Workshop.

For more information about the High-performance Embedded Workshop, refer to the "High-performance Embedded Workshop V.4.04 User's Manual." Following section describes how to install the High-performance Embedded Workshop.

3.1.1 High-performance Embedded Workshop Installation

(1) Execute "HewInstMan.exe" stored in the cross tool CD-ROM (SuperH RISC engine C/C++ Compiler Package). The Install Manager will start up automatically. Click "Installation".

.

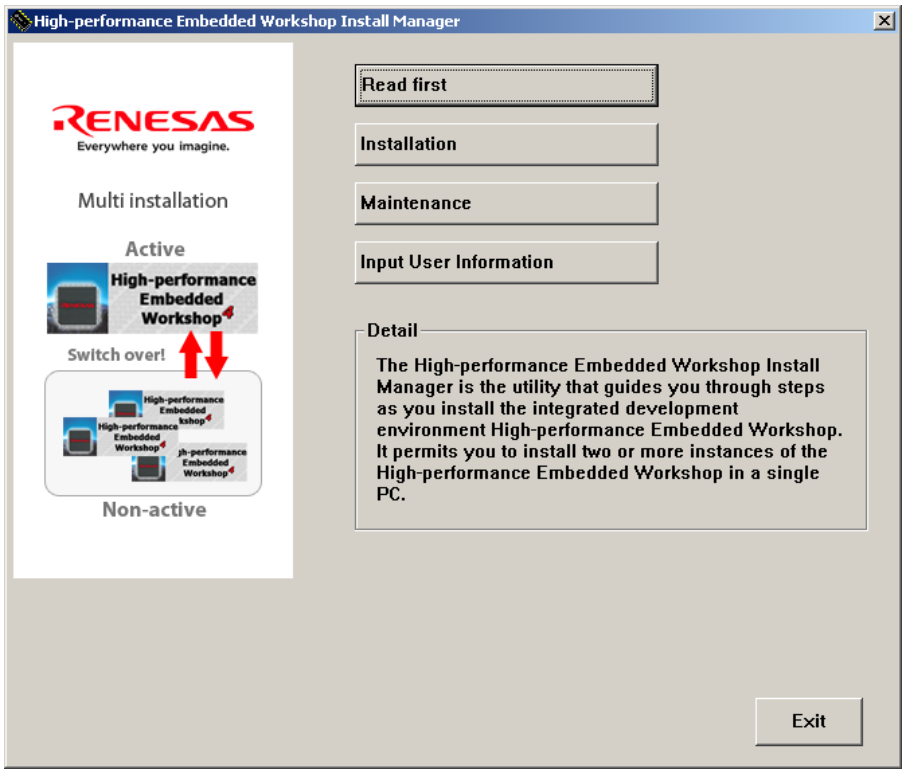

Figure 3.1.1 Installation Procedure (1/4)

(2) Following dialog box will appear as Figure 3.1.2. Click “Next”.

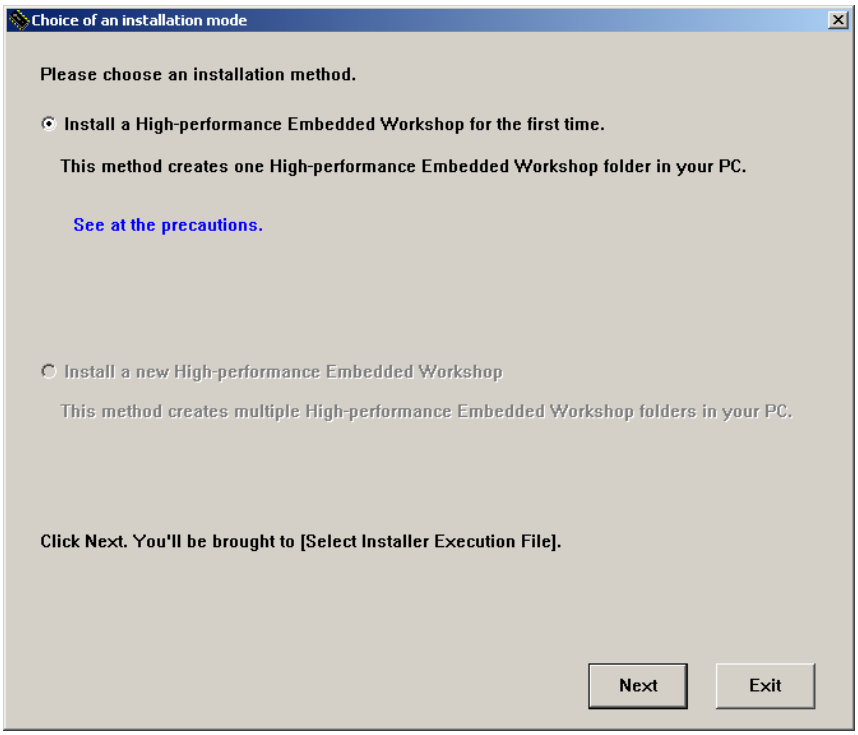

Figure 3.1.2 Installation Procedure (2/4)

Note: If the High-performance Embedded Workshop is already installed, select the “**Install a new High-performance Embedded Workshop**” radio button to install it in another directory.

(3) Follow the on-screen instructions to continue.

(4) Install the AutoUpdate Utility. Click “Next”.

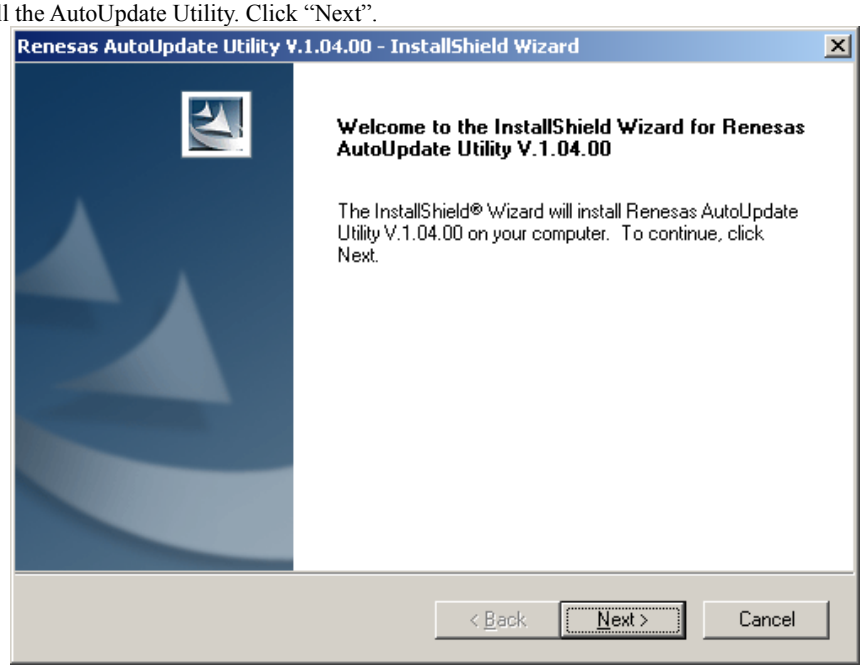

Figure 3.1.3 Installation Procedure (3/4)

Note: If the “AutoUpdate Utility” checkbox is not ticked, above window as Figure 3.1.3 will not appear.

(5) Follow the on-screen instructions to continue installation. When all installation is completed, following window will appear as Figure 3.1.4. Click “Exit”.

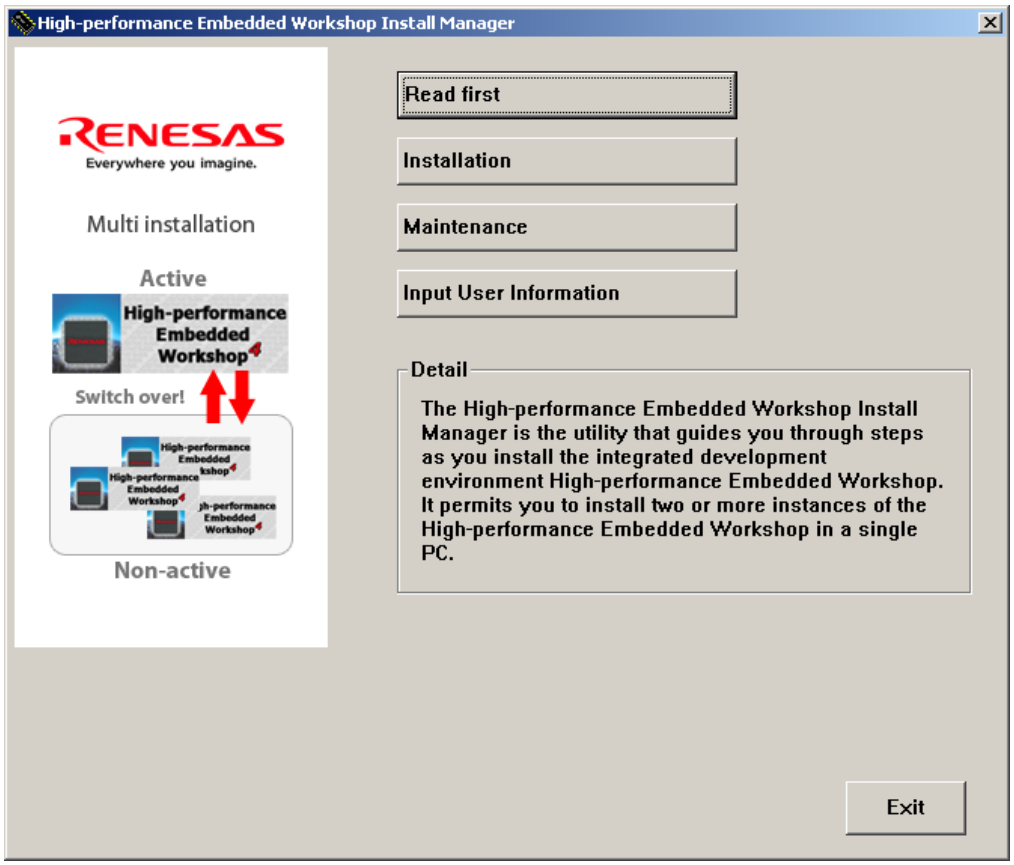

Figure 3.1.4 Installation Procedure (4/4)

3.2 Set up the E10A-USB Emulator Software

This section explains how to set up the E10A-USB emulator software.

3.2.1 E10A-USB Emulator Software Installation

(1) Execute "HewInstMan.exe" stored in the E10A-USB emulator software CD-ROM. The Install Manager will start up automatically. Click [Installation].

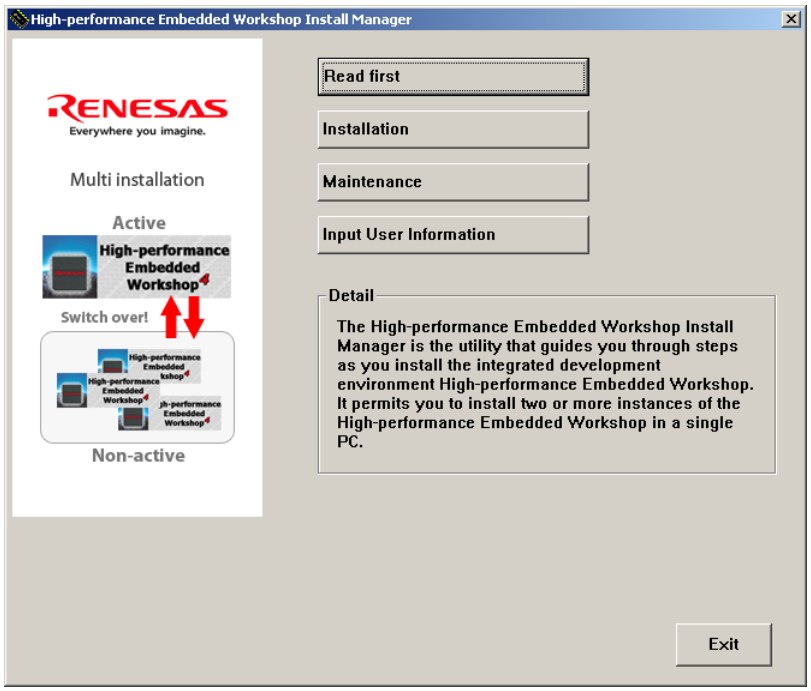

Figure 3.2.1 E10A-USB Software Installation (1/7)

(2) Following dialog box will appear as Figure 3.2.2. Select the "**Update the active High-performance Embedded Workshop**" radio button and click "Next".

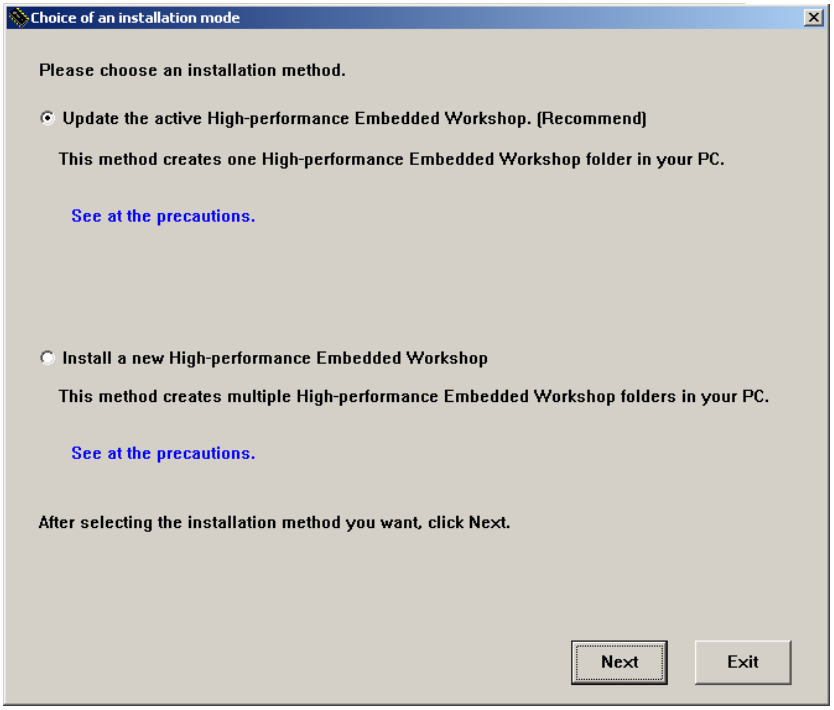

Figure 3.2.2 E10A-USB Software Installation (2/7)

Note: If the High-performance Embedded Workshop is already installed, select the "**Install a new High-performance Embedded Workshop**" radio button to install it in another directory.

(3) Following dialog box will appear as Figure 3.2.3. Select "SuperH RISC engine Family SH-2 Device Group", "SH7619" and click "Next".

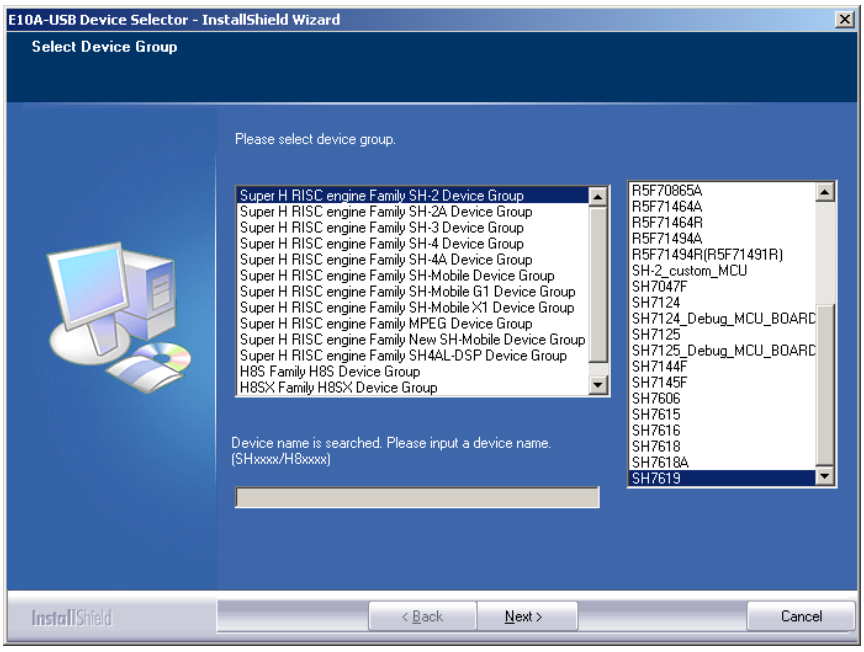

Figure 3.2.3 E10A-USB Software Installation (3/7)

(4) Installation will start. Click "Next". Follow the on-screen instructions to continue the installation.

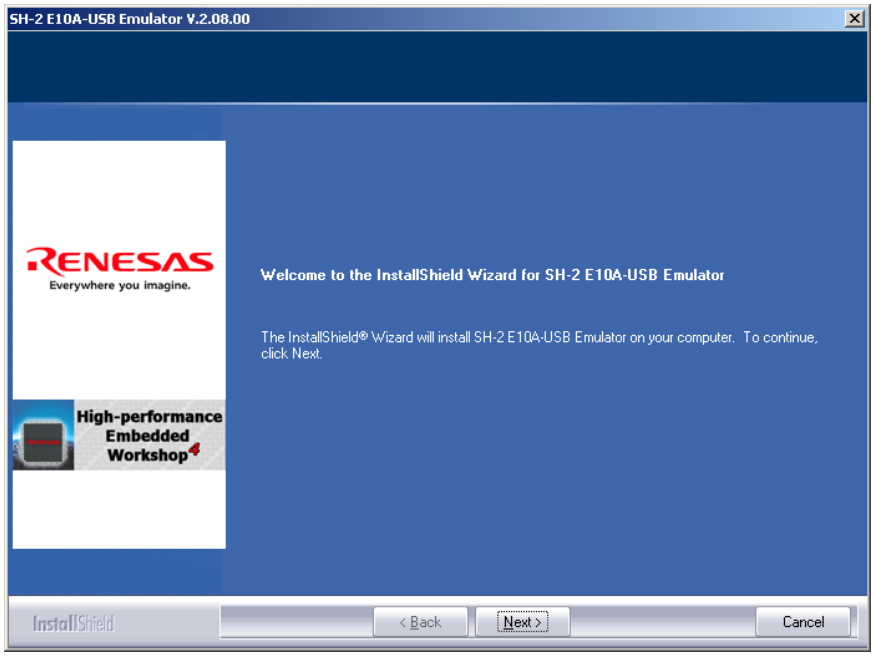

Figure 3.2.4 E10A-USB Software Installation (4/7)

(5) Click “Next” to install the AutoUpdate Utility.

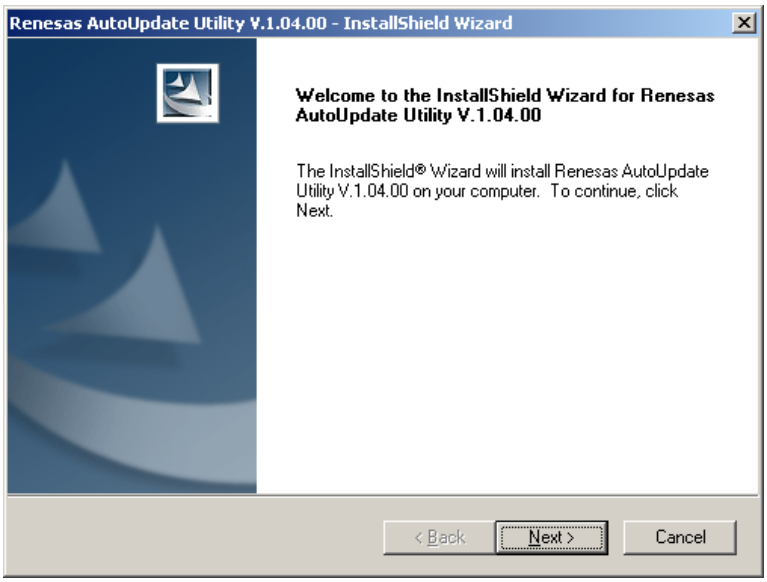

Figure 3.2.5 E10A-USB Software Installation (5/7)

(6) Following window will appear after the installation is completed. Click “Finish”.

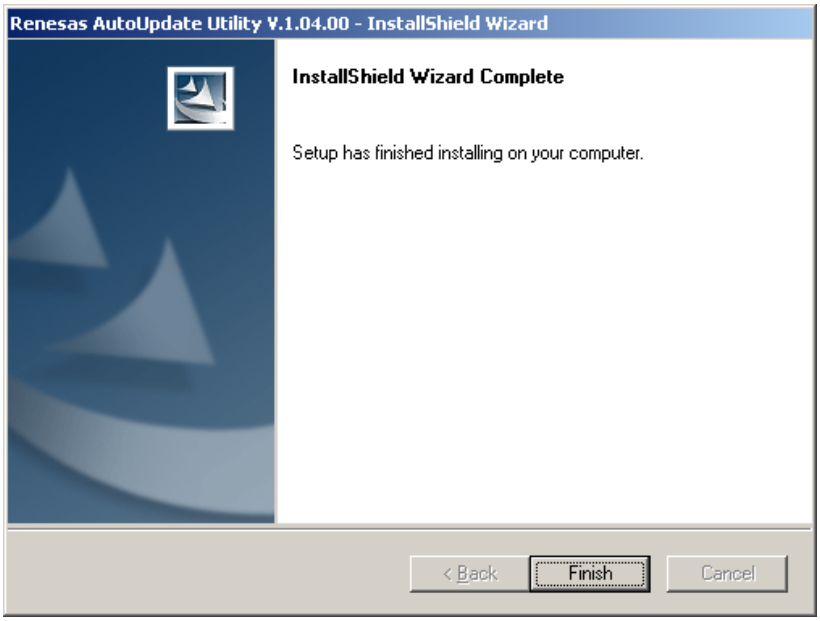

Figure 3.2.6 E10A-USB Software Installation (6/7)

(7) Following window will appear when the installation is completed. Click “Exit”.

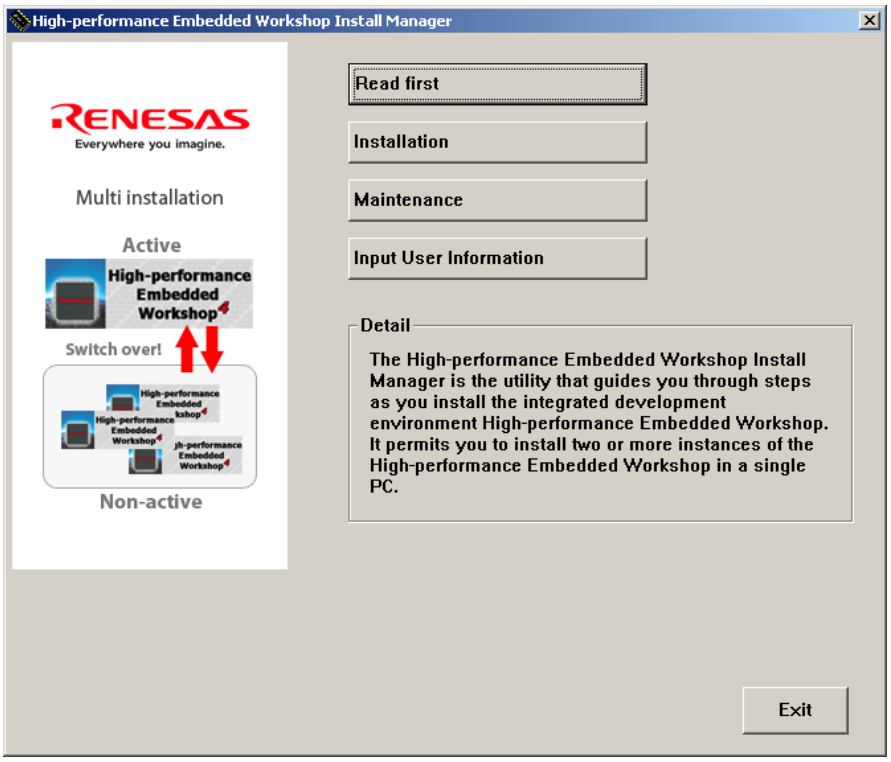

Figure 3.2.7 E10A-USB Software Installation (7/7)

3.2.2 Set up the E10A-USB Emulator

(i) Set up New Firmware

This section explains how to set up the E10A-USB emulator firmware for the first time.

When the installed E10A-USB emulator firmware supports the SH-2 device group, skip this step and go to paragraph (**ii**) “Set up the E10A-USB Emulator Driver”.

To setup the firmware, follow the on-screen instructions to change the DIP switches on the E10A-USB emulator. Figure 3.2.8 shows the DIP switches on the E10A-USB emulator.

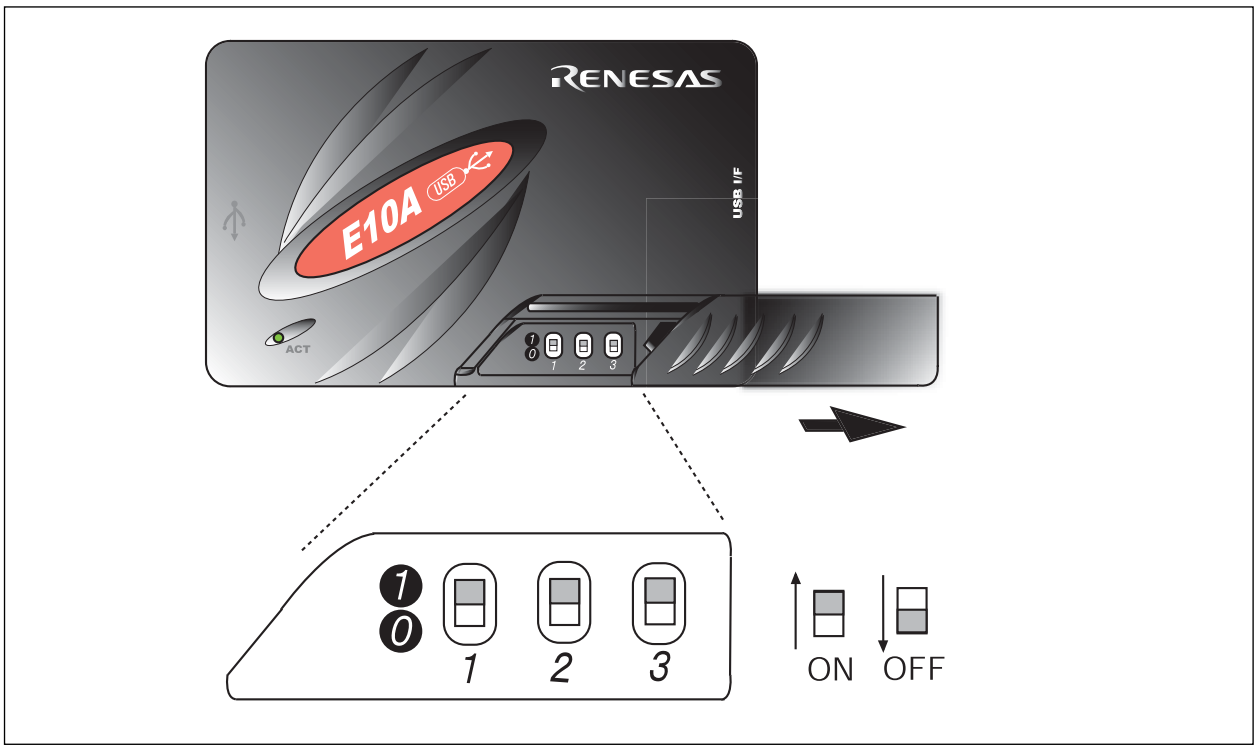

Figure 3.2.8 DIP switches

(1) Open the sliding switch cover and check that the switch (SW1) for setting the emulator is turned to “1”.

(2) Select [All Programs] -> [Start] -> [Renesas High-performance Embedded Workshop] -> [Tools] -> [Setup Tool for E10A-USB Emulator] -> [SH-2 Device Group]. A setup tool for the E10A-USB emulator will start up.

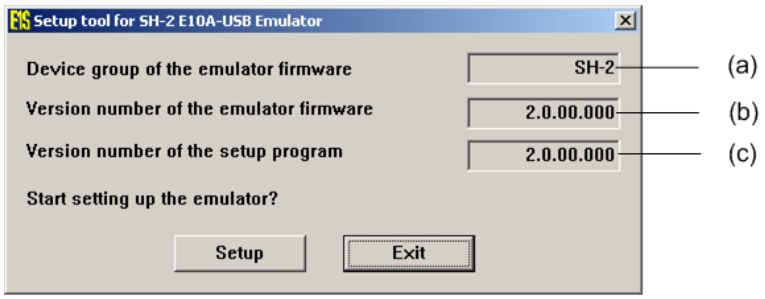

Figure 3.2.9 E10A-USB Emulator Setup Tool

(a) Device group of the emulator firmware: Shows the name of the device group currently set

(b) Version number of the emulator firmware: Shows the version number of software for controlling the SH2 group in the emulator

(c) Version number of the setup program: Shows the version number of the setup program

Note: The version number shown in the dialog box depends on the version that the E10A-USB emulator supports.

Notes
• If the version numbers shown in (b) and (c) are the same, setup of the emulator is not required. Set up the emulator only when “-.-.--.---” is shown in (b) or the version number of (b) is older than that of (c).
• If the connected emulator does not support the SH7619 MCU, following error message will appear to terminate the setup tool. You need to purchase a license tool for device group additions for the SH7619 to set up the firmware.

Figure 3.2.10 Error Message

• If the following error message appears, the host computer is not connected to the E10A-USB emulator or the setup switch (SW1) is turned to “0”. If the setup switch (SW1) is “0”, set it to “1” and connect the USB cable again

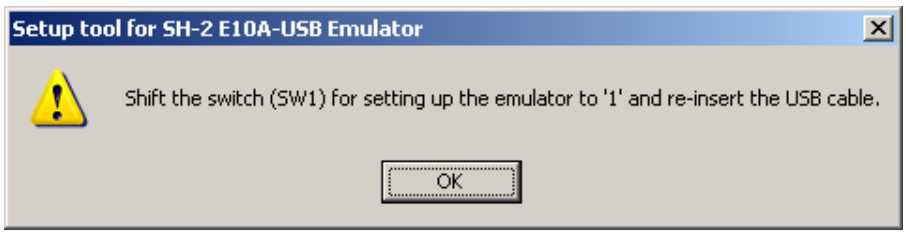

Figure 3.2.11 Error Message

• If the [Add New Hardware Wizard] appears, refer to (ii) Set up the E10A-USB emulator driver.

(3) Clicking the “Setup” button (Figure 3.2.9) shows the following dialog box.

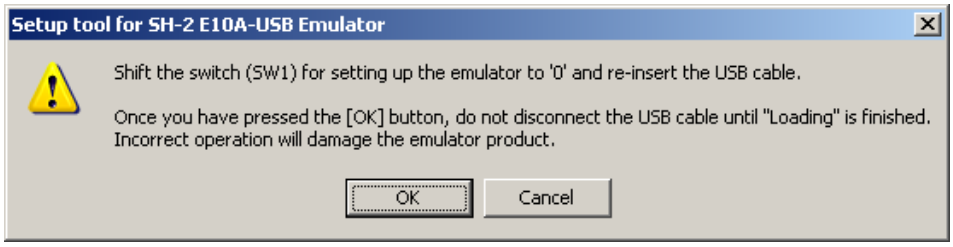

Figure3.2.12 Setup Tool for SH-2 E10A-USB Emulator Dialog box

(4) Turn the setup switch (SW1) to “0”, connect the USB cable again, and click ”OK”. The system will start setting up the emulator firmware.

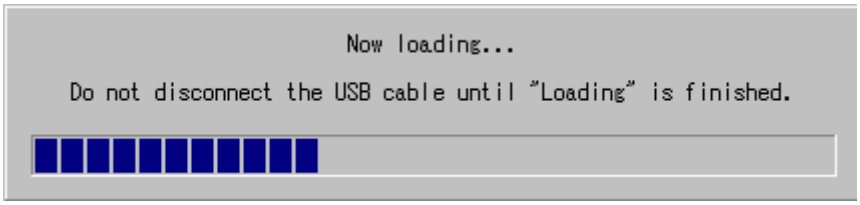

Figure 3.2.13 Firmware Set Up Started

CAUTION

- Do not turn off the power for the host computer or remove the USB cable while the system is setting up the E10A-USB emulator. Such an act may cause the E10A-USB emulator to break down.

(5) When the following dialog box appears, the E10A-USB emulator setup is completed.

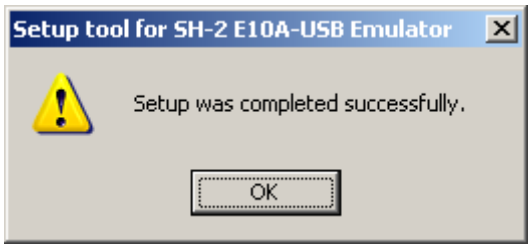

Figure 3.2.14 Setup Completed

(6) When the E10A-USB emulator setup has been completed, the following message will appear.
Turn the setup switch (SW1) to “1”, connect the USB cable again, and click “OK”.

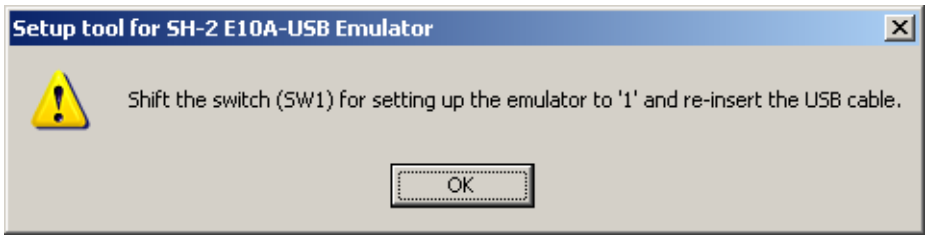

Figure 3.2.15 [Setup Tool for SH-2 E10A-USB Emulator] Dialog box

Note: Be sure to turn the SW1 to “1” except when using the setup tool.

(7) The following dialog box will appear again. Check if it is the latest version of the firmware, and click [Exit]. The new firmware setup is now completed.

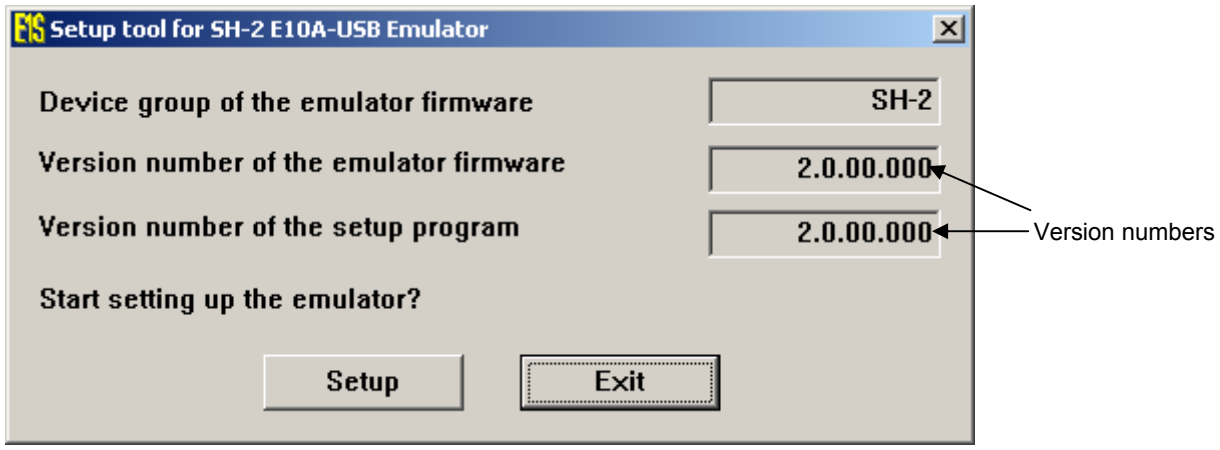

Figure 3.2.16 E10A-USB emulator setup tool (Completed)

Note: The version number shown in the dialog box depends on the version that the E10A-USB emulator supports.

(ii) Set up the E10A-USB Emulator Driver

Following describes how to set up the E10A-USB emulator driver.

The setup procedure described below is for the Windows XP.

Note: Following dialog boxes appear when the E10A-USB emulator driver is set up for the first time or when the emulator is connected for the first time after the USB port on the host computer is changed. It may take some time to appear the dialog box.

(1) [Welcome to the Found New Hardware Wizard] is activated.

Select the "**Install from the list or specific location (Advanced)**" radio button, then click "Next".

Figure 3.2.17 Found New Hardware Wizard (1/3)

(2) Select the "**Search for the best driver in these locations**" radio button and tick the "Search removable media (floppy, CD-ROM...)" checkbox. Then click "Next".

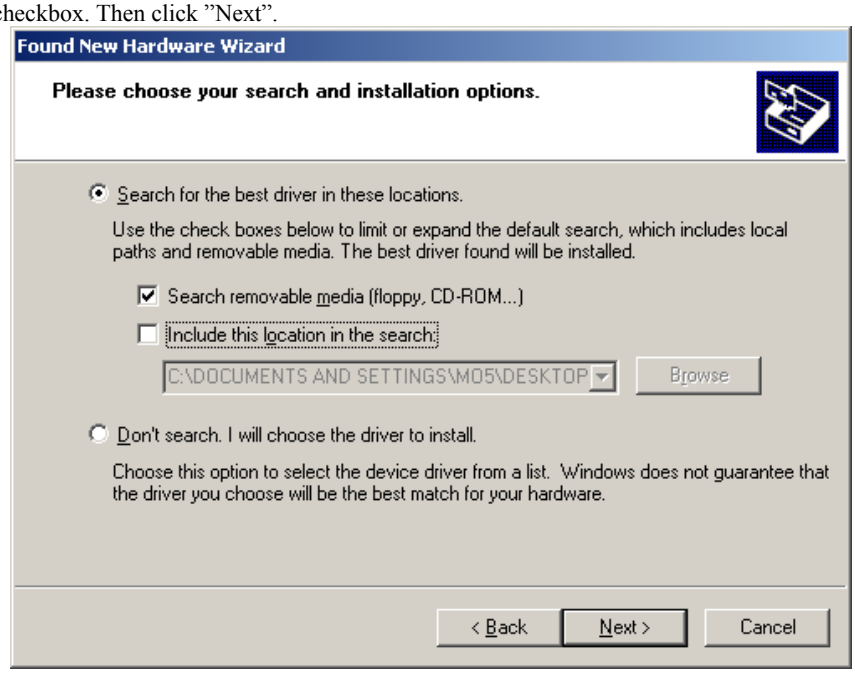

Figure 3.2.18 Found New Hardware Wizard (2/3)

(3) Search for the driver in the CD-ROM, select “<drive>:¥drivers¥usb¥xp¥e1usb.cdr.inf”, and then click “Next”. The underlined ‘xp’ indicates the version of the operating system (This example is for Windows XP).

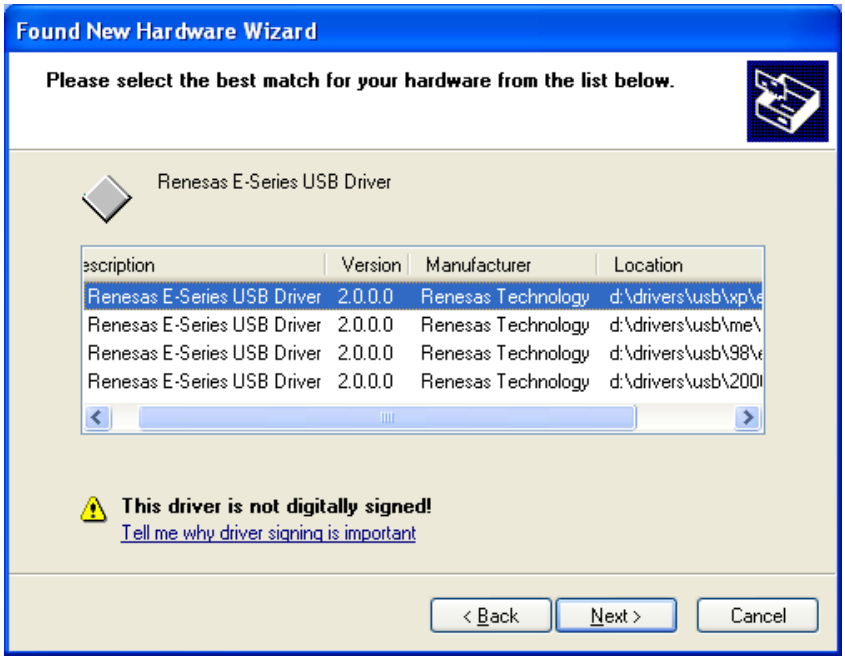

Figure3.2.19 New Hardware Wizard (3/3)

Note: When an error message saying the software you are installing has not passed Windows Logo testing.. appears, just click “Continue Anyway”. The version numbers shown in the dialog box depends on the version that the E10A-USB emulator supports.

(4) [Completing the Found New Hardware Wizard] dialog box will appear. Click ”Finish”. The E10A-USB emulator driver setup is now completed.

Figure 3.2.20 New Hardware Installed

(5) Activate the Device Manager to confirm that the USB controller driver has been installed.

➢Activating the Device Manager

[Start] -> [Control Panel] and double-click [System] icon. In [Properties] dialog box, click the [Hardware] tab, and then click [Device Manager].

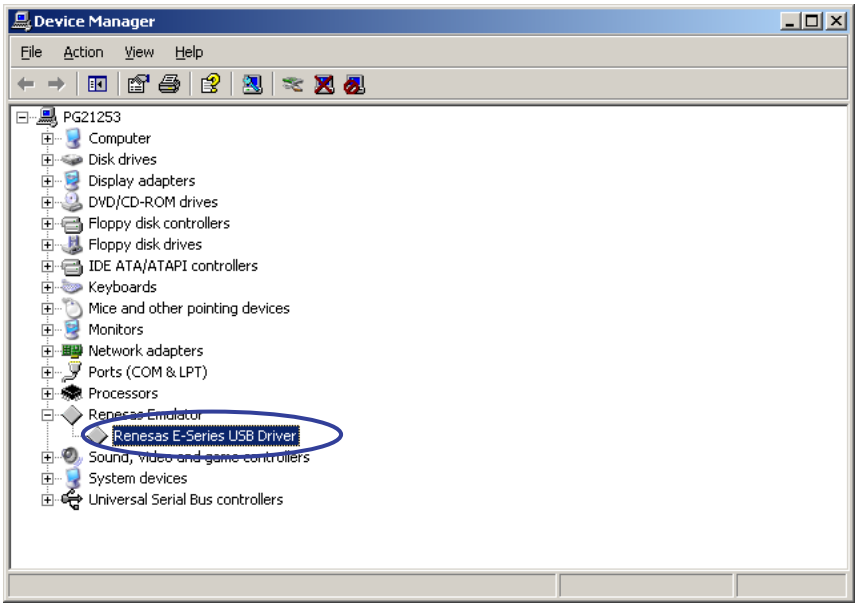

Figure 3.2.21 Confirming the USB Controller Driver is Installed (Device Manager)

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Chapter 4
Executing the Software

4.1 Execute the Sample Software

This product comes with a sample software for checking the hardware operation and referring for the software development. Following describes how to download the load module of the sample software.

Note: Set DIP switches (SW4) on the M3A-HS19 CPU board as the default setting to execute the sample software. For details on the DIP switches setting, refer to Section 3.2.2, “Switches and LEDs” in the M3A-HS19 User’s Manual.

4.1.1 Prepare to Download the Sample Software

Copy “Sample_software” directory stored in the CD-ROM into the working directory of the host computer. When the “Sample_software” directory is created with a read-only attribute, cancel the read-only attribute. Do not use double-byte characters in the directory path. Presence of such characters may cause the wrong operation of the cross tools.

The explanation below assumes that this directory has been copied to the C:¥WorkSpace directory.

Notes:
• The High-performance Embedded Workshop and the E10A-USB emulator software must be installed to download the load module of the sample software. (Refer to Chapter 3).

• The SuperH RISC engine C/C++ Compiler Package must be installed to modify the sample software.

4.1.2 M3A-HS19 and E10A-USB Startup (High-performance Embedded Workshop Startup)

(1) Connect the host computer and the E10A-USB emulator.

(2) Connect the M3A-HS19 and the E10A-USB emulator. (Do not turn on the power for the M3A-HS19 yet.)

(3) Select [Start] menu → [Programs] → [Renesas] → [High-performance Embedded Workshop](folder)
→ [High-performance Embedded Workshop].

(4) The [Welcome] dialog box will appear.
Select the ”**Browse to another project workspace**” radio button and click “OK”.

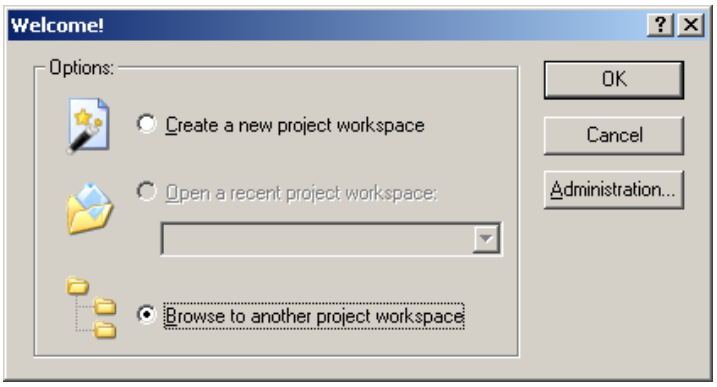

Figure 4.1.1 [Welcome!] Dialog box

Note: A project workspace is a work area for user, to store projects and their configurations. A project consists of a configuration necessary to create programs or final binary files and a set of files. For more information about the project workspace, refer to the “SuperH RISC engine High-performance Embedded Workshop 4 User’s Manual.”

(5) The [Open Workspace] dialog box will appear, specify the following directory.

Directory to store the sample software
"C:¥WorkSpace¥Sample_software¥sh7619_sample"

(6) After specifying the directory, select the following file and click “Select” to open.

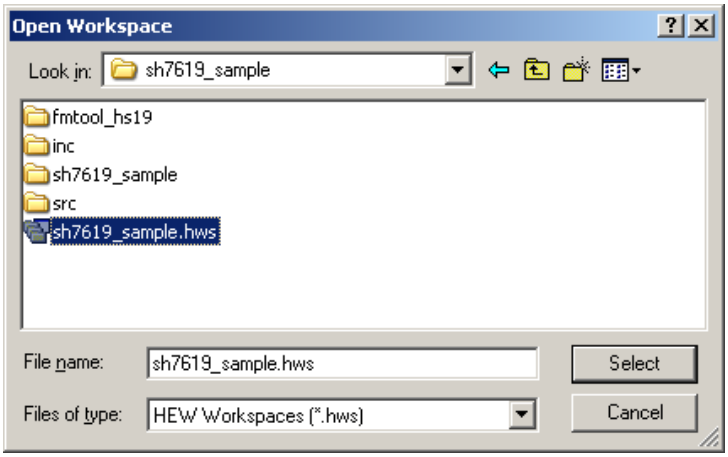

Figure 4.1.2 [Open the Workspace] Dialog box

Note: The dialog box that indicates the directory in the workspace has been moved may appear at the first time. Click “Yes” to continue.

(7) The [CPU Select] dialog box will appear. Click ”OK”.

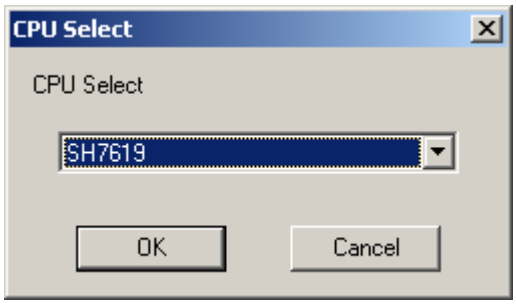

Figure4.1.3 [CPU Select] Dialog Box

Note: A message ”Please choose driver“ will appear at the first time. Click ”OK“ to show the following window to select the driver. Select ”Renesas E-Series Driver“.

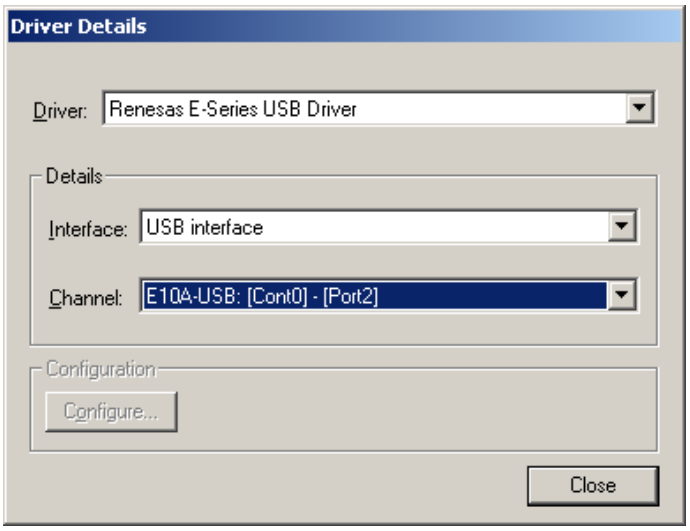

Figure 4.1.4 [Driver Details] Dialog Box

(8) Following dialog box will appear and start to connect the emulator.

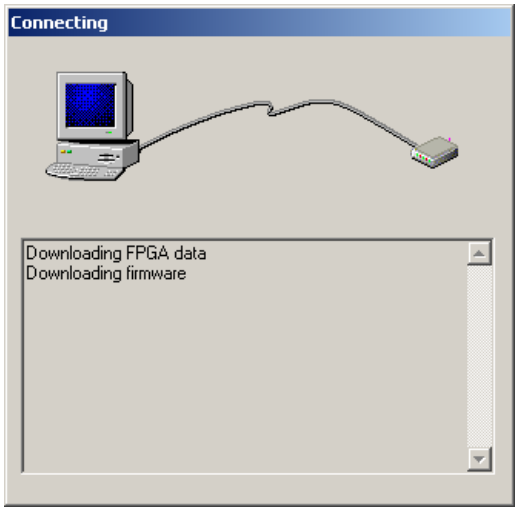

Figure 4.1.5 [Connecting] Dialog Box

(9) The following dialog box will appear. Ignore this dialog box, and turn on the power for the M3A-HS19 CPU board. Then, press the reset button on the CPU board, and click ”OK“ on the dialog box.

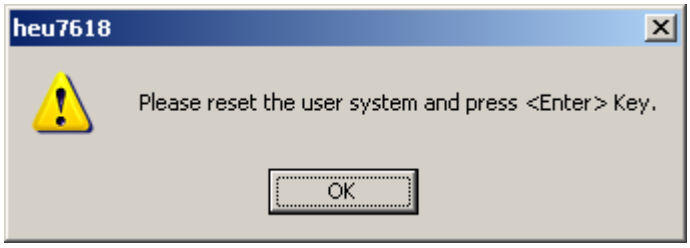

Figure 4.1.6 Dialog box to request the RESET signal input

Note: If the reset signal cannot be detected, the following dialog box will appear. Click ”Ignore” to issue an internal reset to the CPU and to start up the system.

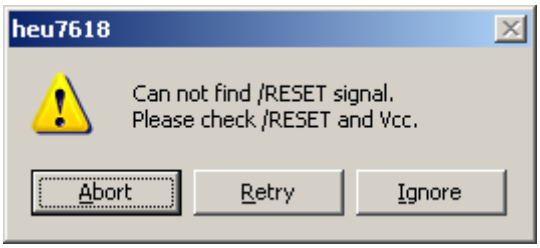

Figure 4.1.7 [Cannot find RESET Signal] Dialog Box

(10) When the message “Connected” appear in the [Output] window of High-performance Embedded Workshop, the E10A-USB emulator startup is now completed.

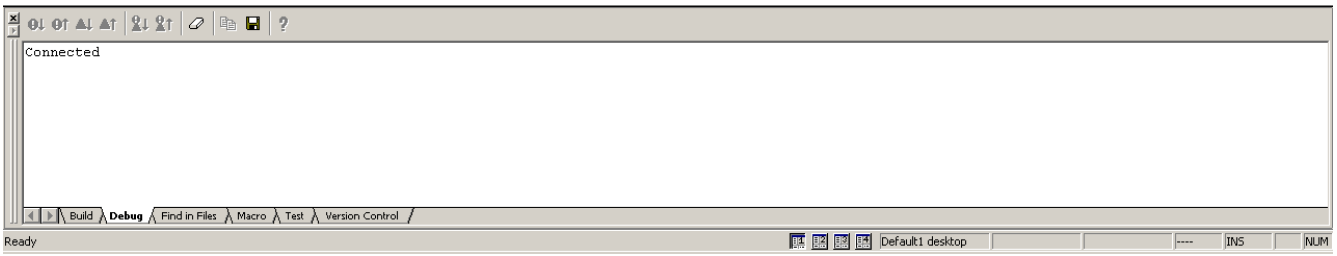

Figure4.1.8 [Output] Window

4.1.3 E10A-USB Emulator Connection Error Dialog

When the E10A-USB emulator does not start up, the following dialog box will appear.

(a) When the following dialog box appears and the emulator cannot be activated as the Note on the top of page 4-5, the M3A-HS19 system power may not supplied. Check the power supply of the M3A-HS19 CPU board.

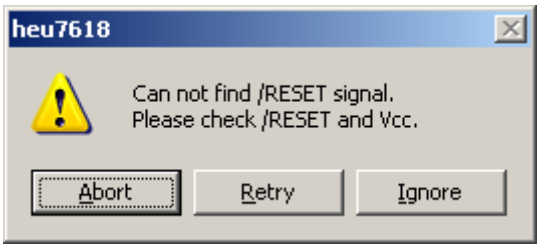

Figure 4.1.9 [Can not find /RESET signal] Dialog Box

(b) If the dialog box shown below is displayed, the H-UDI pins and the H-UDI port connector may not be connected correctly. Check the connection between the H-UDI pins and the H-UDI port connector.

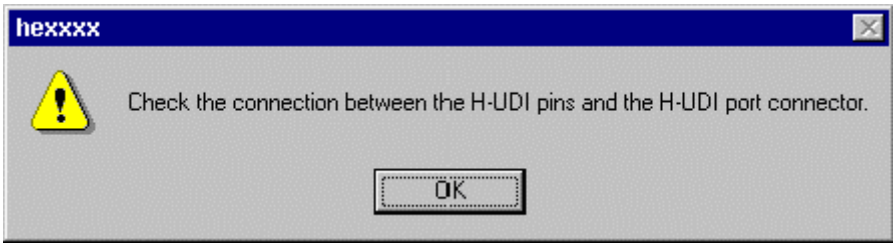

Figure 4.1.10 [Check the connection] Dialog Box

(c) When the following dialog box appears, the E10A-USB emulator firmware may not be set up correctly. Use the setup tool or the license tool for device group addition to set up the firmware for the device group to use.

Figure 4.1.11 [The product currently connected] Dialog box

(d) When the following dialog box appears, the version of the firmware set up in the E10A-USB emulator may be old. Use the setup tool to set up the appropriate version of the firmware.

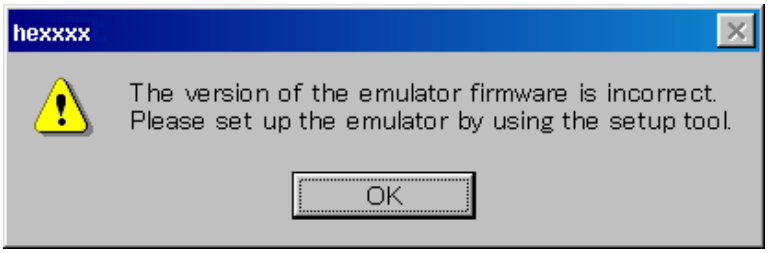

Figure 4.1.12 [The version of the emulator firmware is incorrect] Dialog box

(e) If an appropriate driver is not set up, the following dialog box will appear.

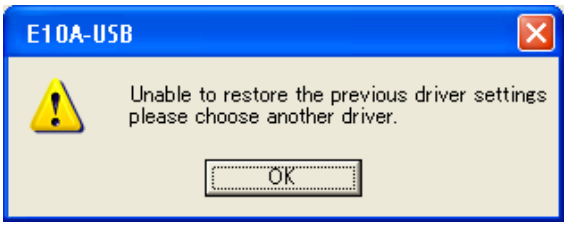

Figure 4.1.13 [Unable to restore the previous driver setting] Dialog box

4.1.4 How to Download the Sample Software

This section describes how to download the load module of the sample software.

Download the load module in the M3A-HS19 external flash memory.

For details about flash memory download settings, refer to the “SuperH Family E10A-USB Emulator User’s Manual.”

(1) Set up the flash memory download function

From [Setup] menu-> [Emulator] ->[System…], open [Configuration] dialog box and then [Loading flash memory] tab.

For “File Name”, specify the flash memory download program “fmtool_hs19.mot”. The sample workspace shall have the flash memory download program in the following directory.

"C:¥WorkSpace¥Sample_software¥fmtool_hs61¥fmtool_hs19.mot"

As shown in Figure 4.1.14, select “Enable” for Loading flash memory. Check “File name”, “Bus Width of Flash Memory” and “Entry point” are set as shown below, and then click “OK”.

Notes:

Check the setting of “Loading flash memory” every time the E10A-USB emulator is attached.

The writing module erases execute the sector erase of the flash memory in the fmtool_hs19.mot. Select “Disable” for the “Erasing flash memory”.

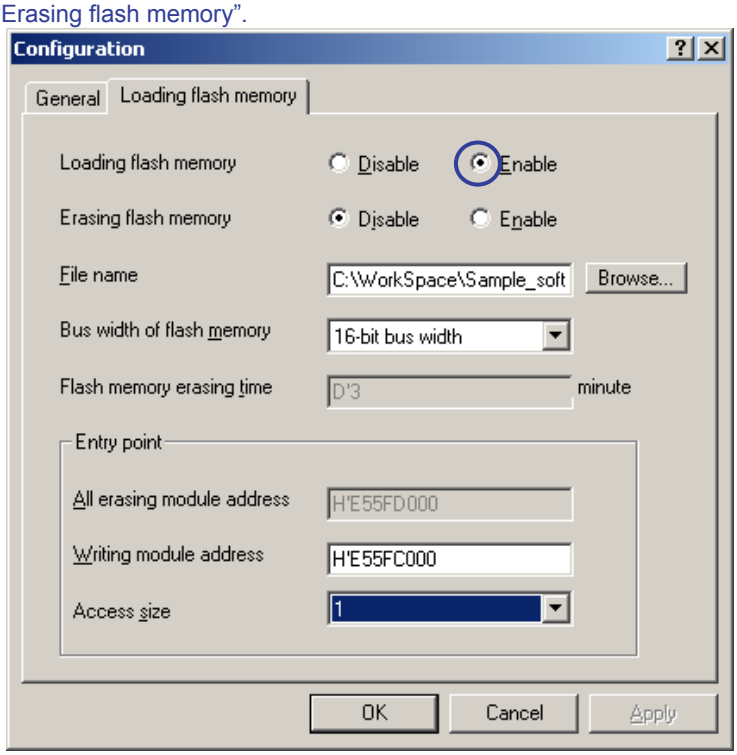

Figure 4.1.14 [Configuration] Dialog Box

(2) Specify the command batch file before downloading

Execute the script file “fmtool_hs19.hdc”, consisting of the access timing and bus control signal settings for the M3A-HS19 flash memory before downloading the sample software.

Open [Debug] menu -> [Debug Settings], and select [Option] tab.

Check that the items on this tab are set as shown below.

- Command batch file load timing (B): Before download of modules
- Command line batch processing (L):

"C:¥WorkSpace¥Sample_software¥sh7619_sample¥fmtool_hs19¥fmtool_hs19.hdc"

The following script file is assumed to be stored in the sample workspace.

"C:¥WorkSpace¥Sample_software¥sh7619_sample¥fmtool_hs19¥fmtool_hs19.hdc"

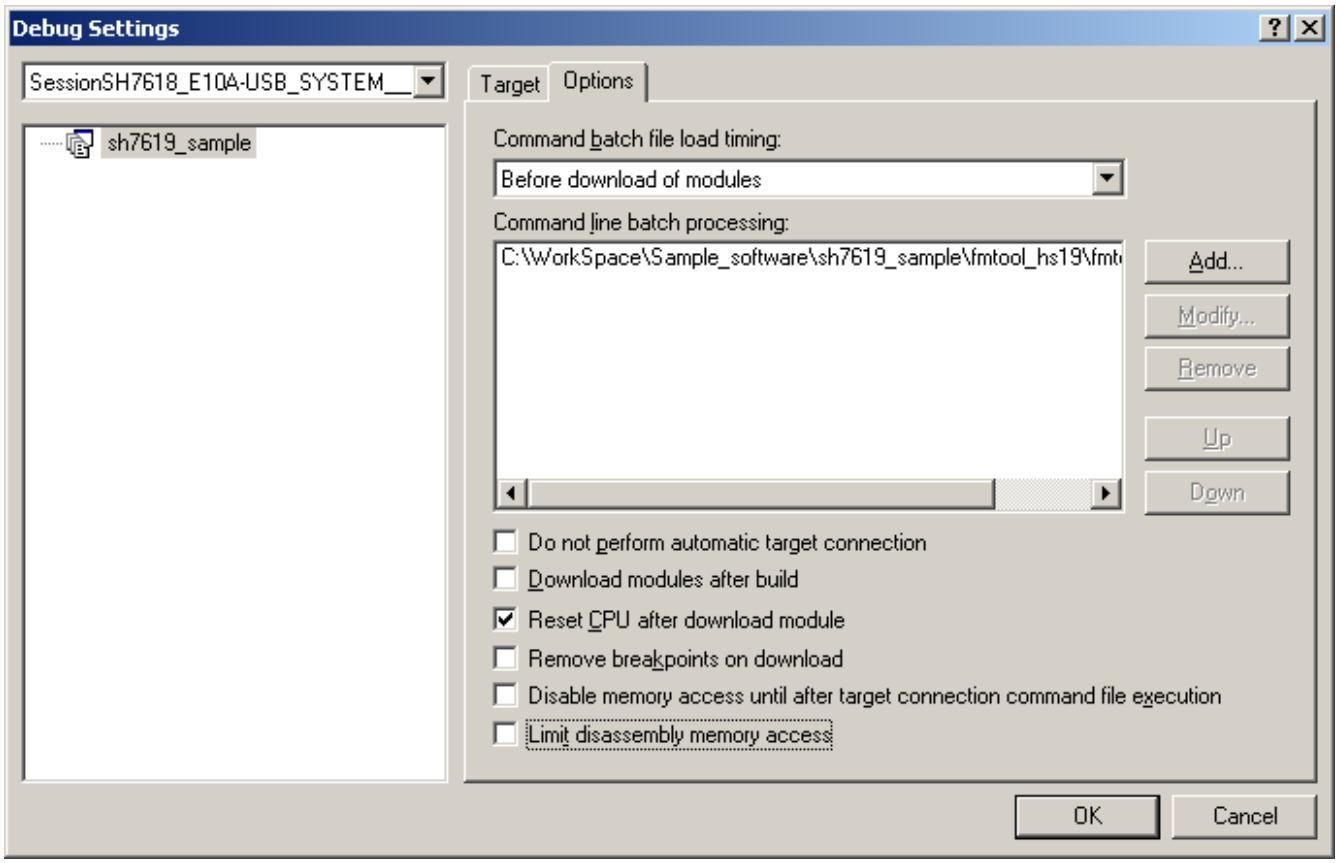

Figure4.1.15 [Debug Settings] Dialog Box

(3) Activate the command line window

When downloading the load module of the sample software, activate [Command Line] window to check whether the script file is running.

Select [View] menu -> [Command Line] to check that [Command Line] window is opened.

Note: If the script file is not executed, downloading the load module into the flash memory cannot be completed.

(4) Download the sample load module

Select [Debug] menu → [Download modules] to select the sample load module.

Figure 4.1.16 shows the download operation window.

Immediately after the sample load module is selected, the script file is automatically executed. Then, the system starts downloading the sample load module.

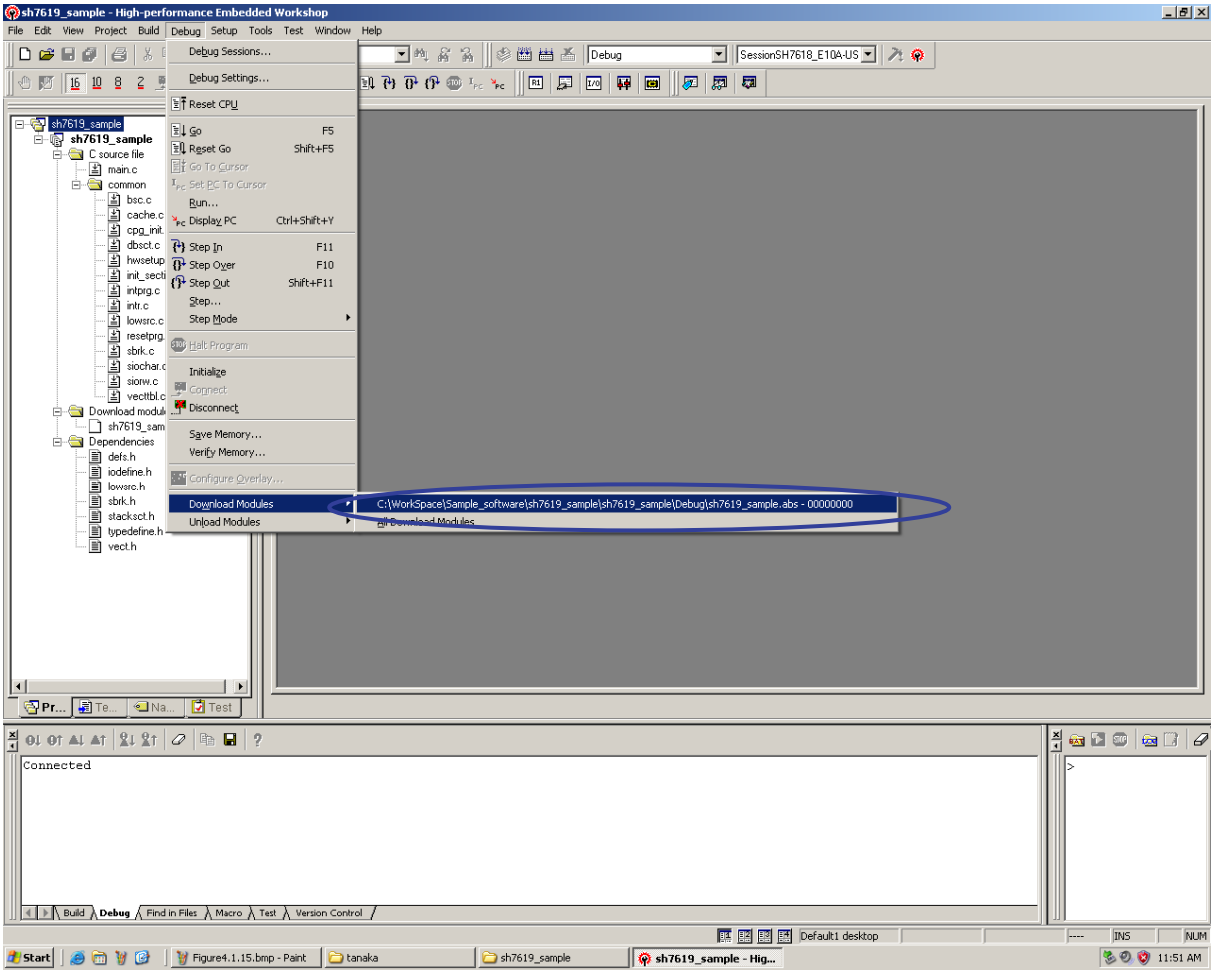

Figure 4.1.16 [Download Operation] Window

(5)Download completed

When the downloading of the sample load module is completed, the program counter will appear in “resetprg.c”. (See Figure 4.1.17)

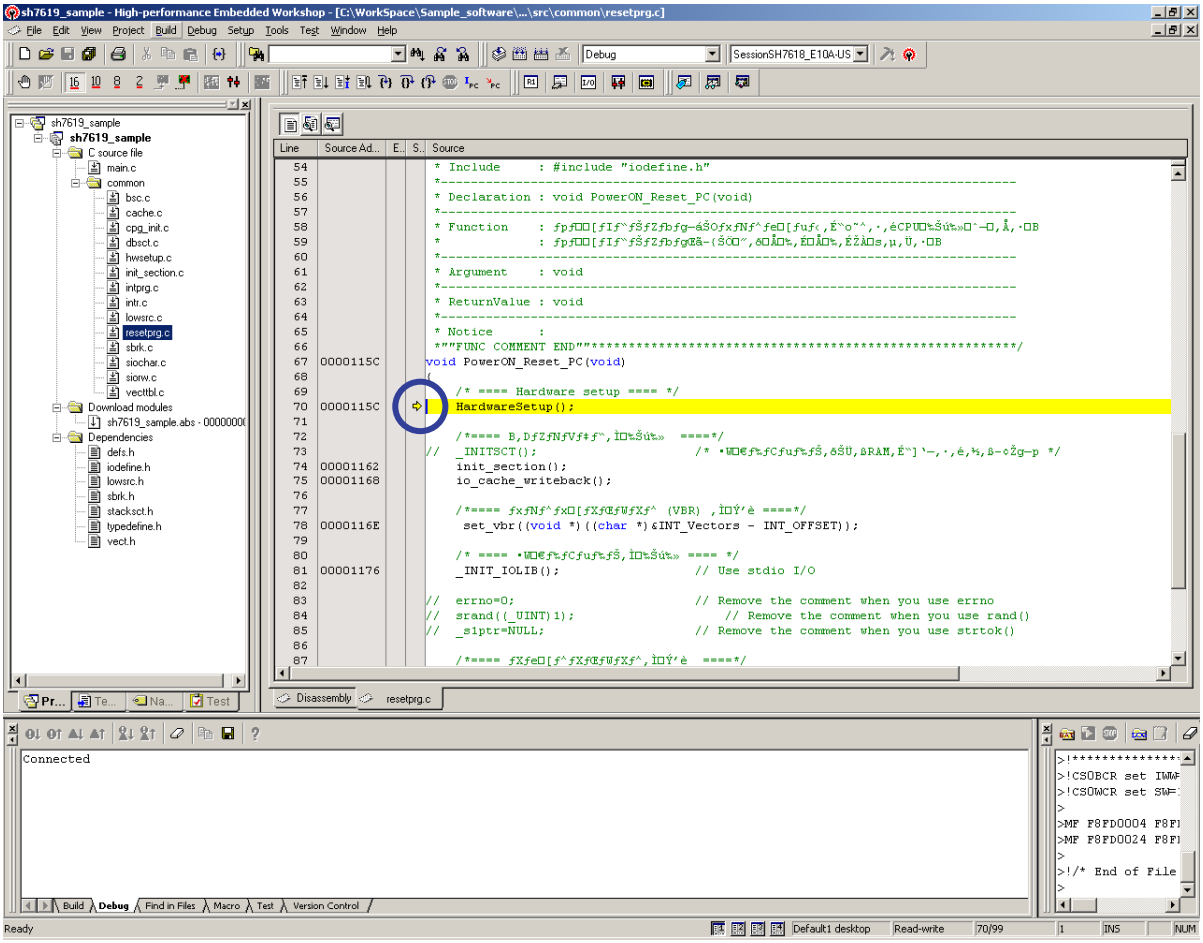

Figure 4.1.17 Download Completed

(6) Executes the program

Select “Go” from the [Debug] menu to execute the software. (See Figure 4.1.18)

If the sample software has been downloaded correctly, LED1 on the M3A-HS19 flashes at 1-second interval.

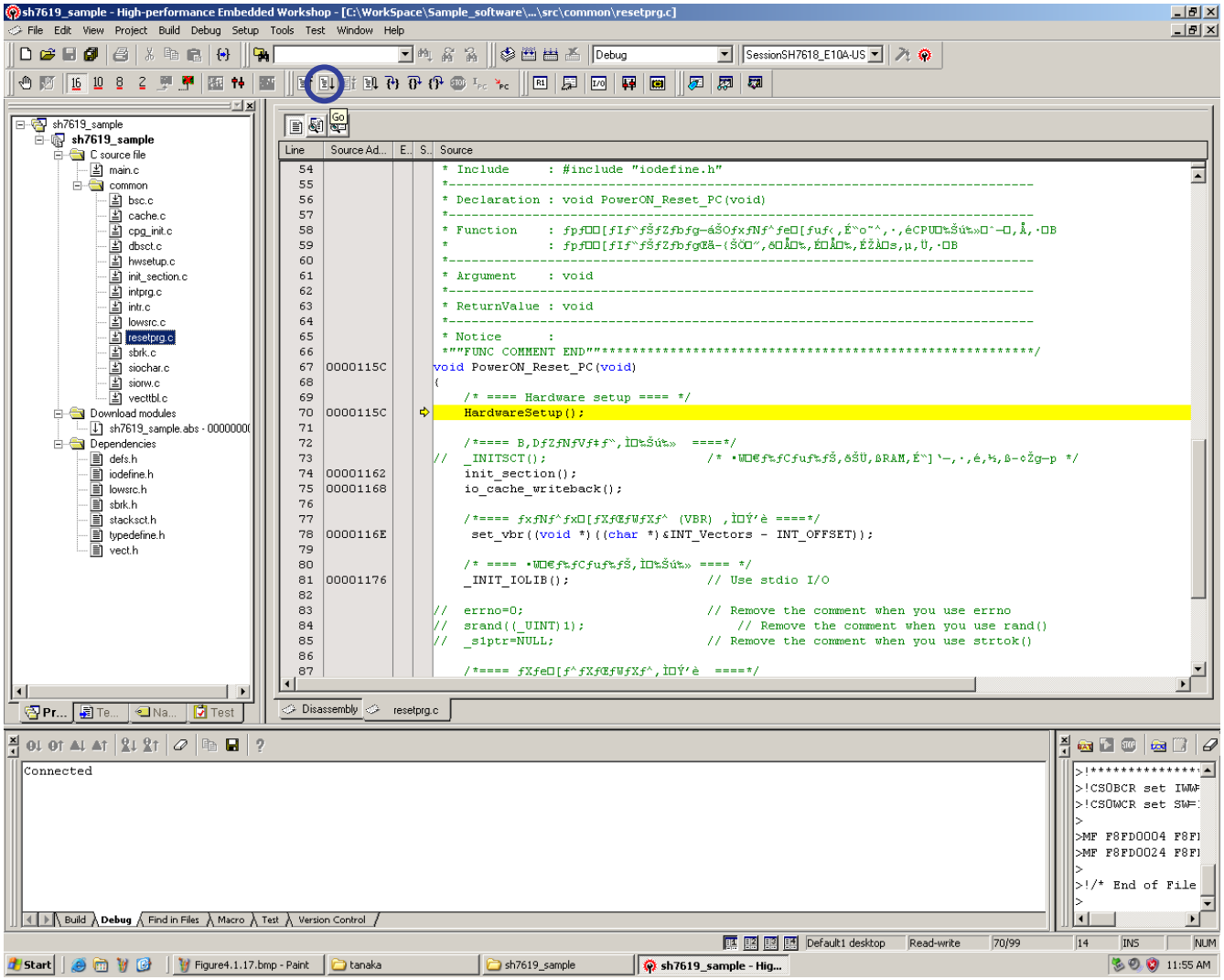

Figure 4.1.18 Executing the program

Notes:

- The contents of “resetprg.c" may depend on the version of the sample software.
- If an error occurs or the sample software does not operate correctly, the hardware or the software may not have been set up correctly. Check the setup procedures in Chapter 2 and Chapter 3.

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Chapter 5
Creating and Running a New Project Workspace

5.1 Create a New Project Workspace

This section explains how to create a new project workspace in the M3A-HS19 CPU board.
Following are steps to create a load module from a new project workspace, to download the module into the M3A-HS19 external flash memory, and to execute the module.

> Note: For details of the project workspace, refer to the note on step (4) in Section 4.1.2, M3A-HS19 and E10A-USB Startup (High-performance Embedded Workshop Startup) on page 4-2.

5.1.1 Prepare to Create a New Project Workspace

Copy the “Sample_software” directory stored in the CD-ROM to the working directory of the host computer. If the “Sample_software” directory is created with a read-only attribute, cancel the read-only attribute. Do not use double-byte characters in the directory path. Presence of such characters may cause the wrong operation of the cross tools.
The explanation below assumes that this directory has been copied to the "C:¥WorkSpace¥Sample_software".

> Note: To create a new project workspace, the High-performance Embedded Workshop, the E10A-USB emulator software, and the SuperH RISC engine C/C++ Compiler Package must be installed in the host computer.

5.1.2 How to Create a New Project Workspace

(1) Connect the host computer and the E10A-USB emulator.
(2) Connect the M3A-HS19 and the E10A-USB emulator. (Do not turn on the power for the M3A-HS19 yet.)
(3) Select [Start] menu, → [All Programs] → [Renesas] → [High-performance Embedded Workshop] (folder)
→ [High-performance Embedded Workshop].
(4) The [Welcome] dialog box will appear.
(5) Select the ”**Create a new project workspace**“ radio button and click “OK”.

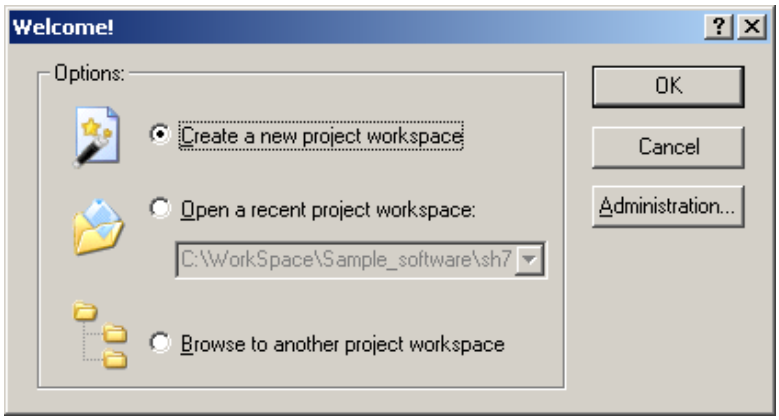

Figure 5.1.1 [Welcome”] Dialog box

(6) Project Generator will start.

In this manual, “test” is used for the workspace name. Check that the Directory, CPU family and Tool chain are set as follows, then click ”OK”.

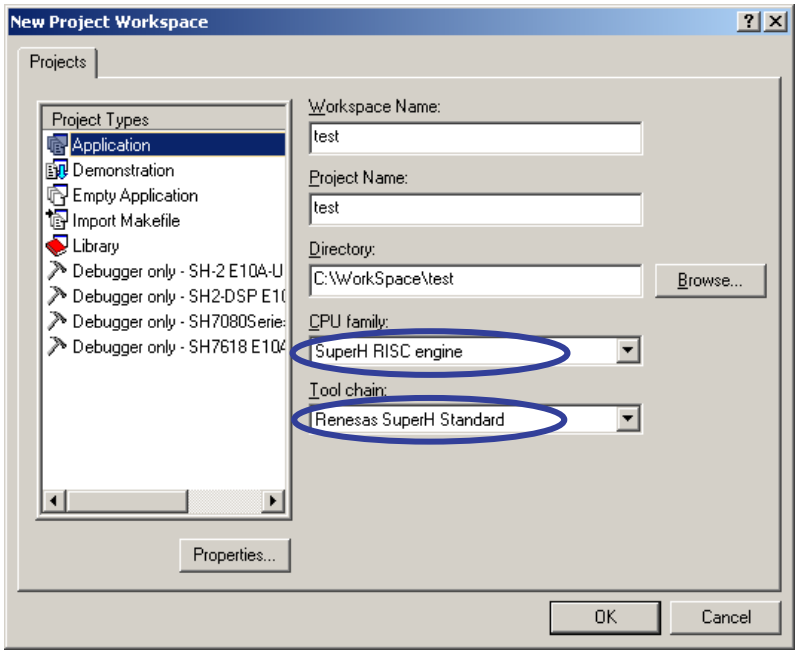

Figure 5.1.2 [New Project Workspace] Dialog Box

(7) In the [New Project-1/9-Select Target CPU] dialog box, select “SH-2” for the CPU Series, and “SH7619” for the CPU Type from the drop-down list.

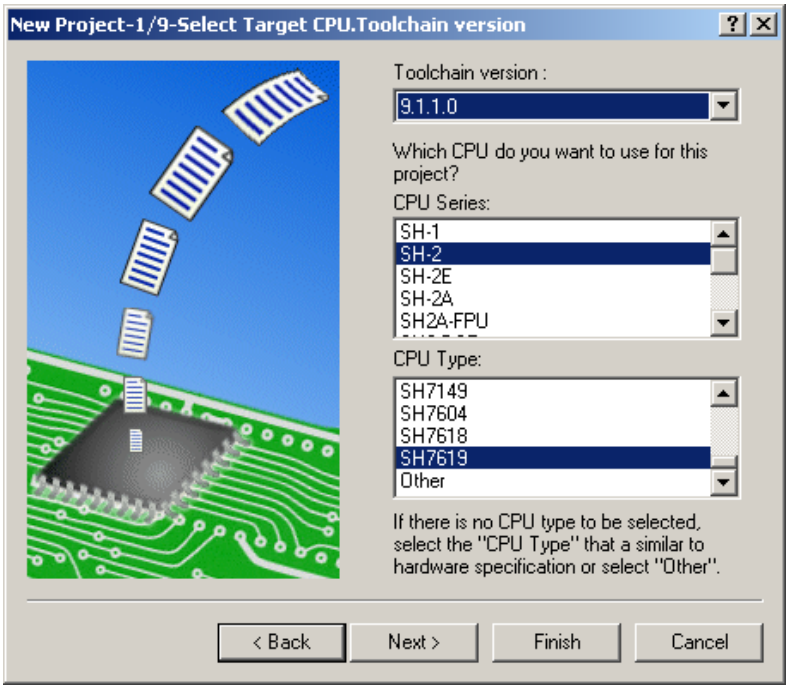

Figure 5.1.3 [New Project-1/9] Dialog Box

(8) Follow the on-screen instructions of the [New Project-2/9] through [New Project-4/9] dialog boxes. Leave the default setting in this installation step (Select the checkbox as appropriate). Click ”Next”.

(9) In the [New Project-5/9] dialog box, set up the stacks as follows and click ”Next”. Change the stack size as appropriate.

Stack Pointer Address: H’E5600000

Stack Size: H’400

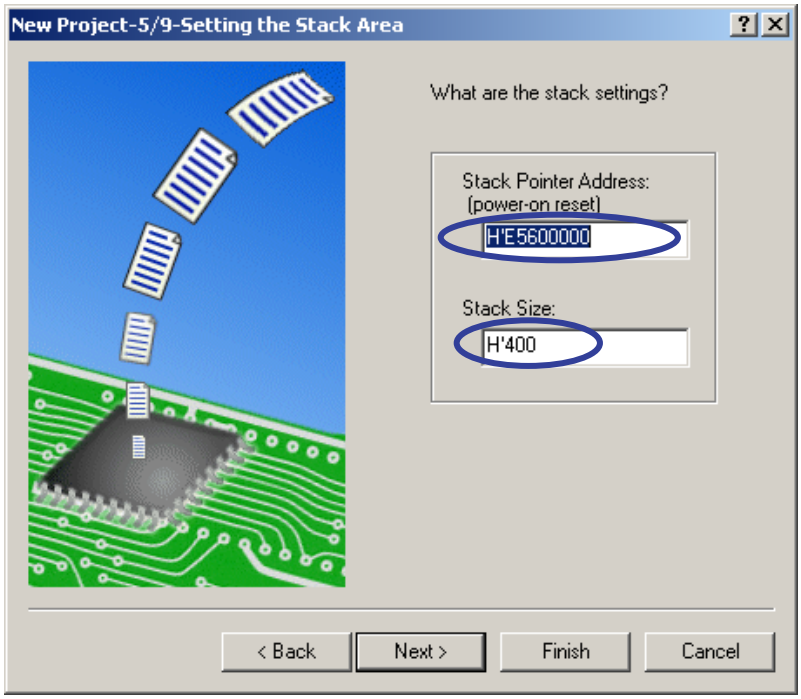

Figure 5.1.4 [New Project-5/9] Dialog Box

(10) In the [New Project-6/9] dialog box, set up a vector.

Leave default setting (the Vector Definition Files checkbox is selected) and click ”Next".

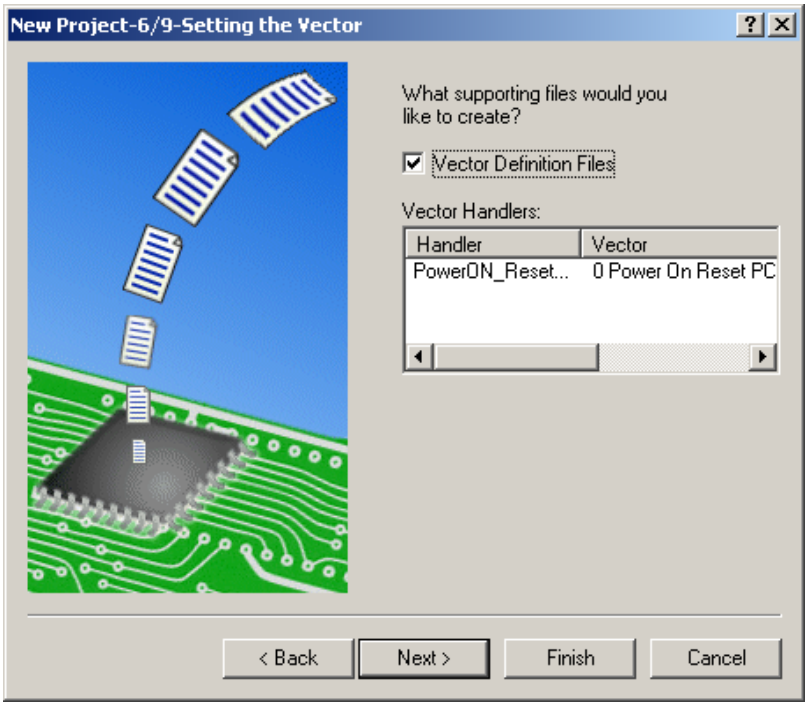

Figure 5.1.5 [New Project-6/9] Dialog Box

(11) In the [New Project-7/9] dialog box, set up the Target as below;

Select the “Target type” and then select “Targets”.

Target type: SH-2

Targets: SH7618 E10A-USB SYSTEM (CPU SH-2)

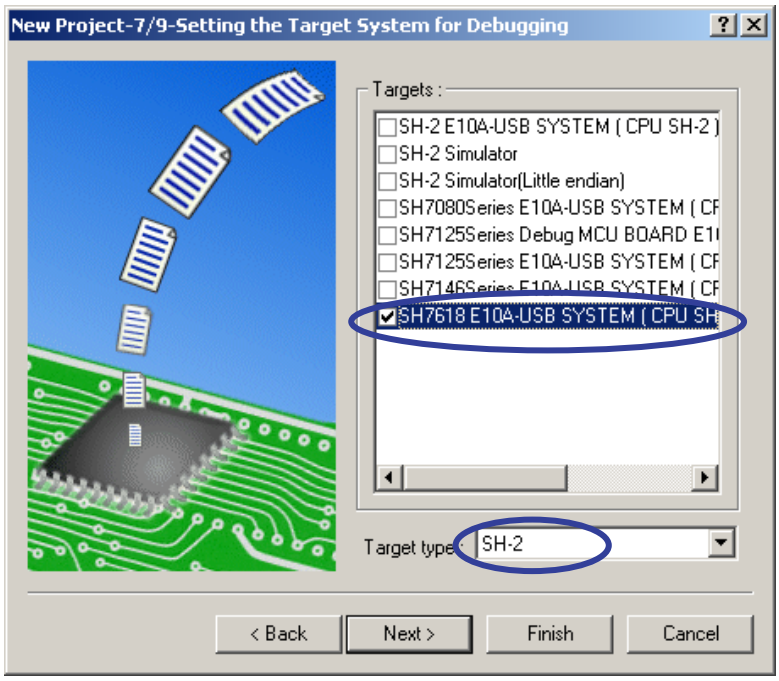

Figure 5.1.6 [New Project-7/9] Dialog Box

(12) Confirm settings in [New Project-8/9] and [New Project-9/9] dialog boxes and click [Finish].

Follow the on-screen instructions to finish the Project Generator.

The High-performance Embedded Workshop is activated to automatically generate the standard source files for the SH-2 device group.

(13) After the High-performance Embedded Workshop is activated, connect the E10A-USB emulator.

The E10A-USB emulator can be connected by switching session to the one for the E10A-USB emulator as shown in Figure 5.1.7

Note: A dialog box to notify that the default session has been modified will appear. Click [Yes].

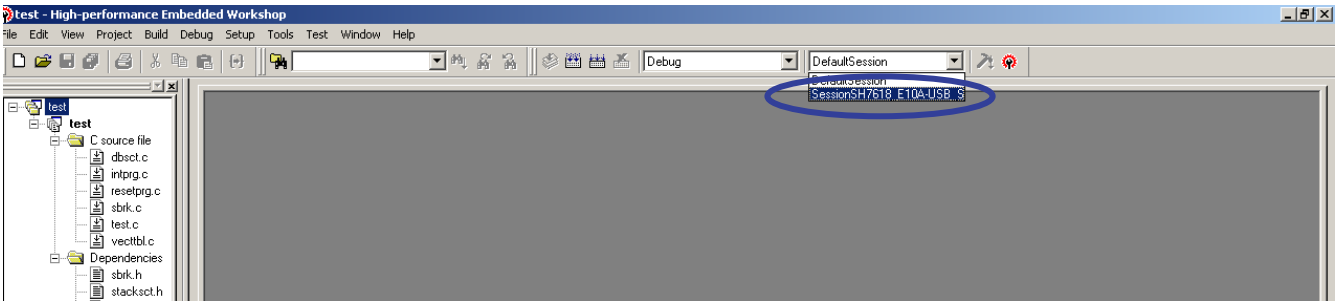

Figure 5.1.7 [E10A-USB Emulator Connection Setup] Window

(14) The [CPU Select] dialog box will appear.

For details on procedure during connection, refer to paragraphs from the step 5 on ”4.1.2 M3A-HS19 and E10A-USB Startup (High-performance Embedded Workshop Startup)”

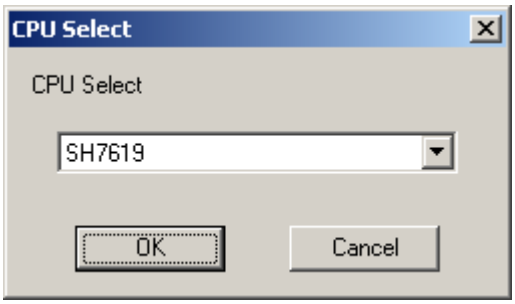

Figure 5.1.8 Select Emulator mode Dialog box

(15) Execute build processing.

Select [Build] menu → [build] to execute the build processing.

After the E10A-USB emulator has been connected, execute build processing once without modifying the standard source file. If a build error occurs here, the SuperH RISC engine C/C++ Compiler Package may not have been installed correctly.

5.2 How to Set Up the Flash Memory Download

This section describes how to set up the M3A-HS19 external flash memory download program.

In this manual, we use the flash memory download program stored in the "C:¥WorkSpace¥Sample_software¥fmtool_HS19" directory.

For details about flash memory download settings, refer to the “SuperH Family E10A-USB Emulator User’s Manual.”

5.2.1 Set Up the Flash Memory Download

(1) Set up the flash memory download function

From [Setup] menu -> [Emulator] -> [System…], select the [Configuration] dialog box, and open [Loading flash memory] tab. For [File name], specify the flash memory download program “fmtool_hs19.mot“ The sample workspace shall have the flash memory download program in the following directory.

"C:¥WorkSpace¥Sample_software¥sh7619_sample¥fmtool_hs19 "

Set up “Loading flash memory”, “File name”, “Bus width of flash memory” and “Entry point” as shown in Figure 5.2.1 and Table 5.2.1. Then click ”OK”.

Note: Check the setting of Loading Flash Memory every time the E10A-USB emulator is attached.

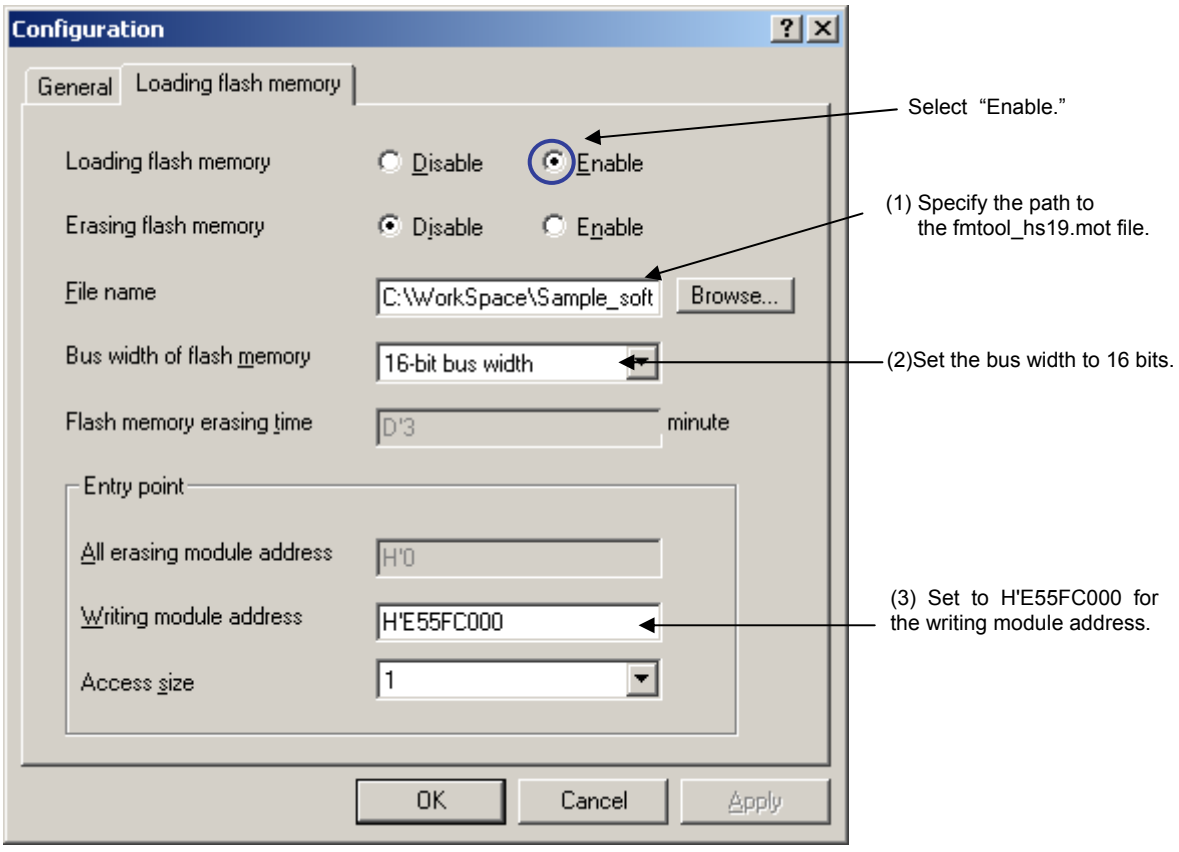

Figure 5.2.1 [Configuration] Dialog Box

Table 5.2.1 Registered Data of Erasing and Writing Module Information

(1) File name	(2) Bus width of flash memory	(3) All erasing module address	(4) Writing module address
fmtool_hs19.mot	16-bit	-	H'E55FC000

5.2.2 Specify the Command Batch File Before Downloading

Execute the script file (fmtool_hs19.hdc), consisting of the access timing and bus control signal settings for the M3A-HS19 flash memory before downloading the flash memory download program

Open [Debug] menu → [Debug Settings] dialog box, and select [Option] tab.
Set up the items on this tab as shown below.

- Command batch file load timing (B): Before download of modules
- Command line batch processing (L): "C:¥WorkSpace¥Sample_softwawe¥sh7619_sample¥fmtool_hs19¥fmtool_hs19.hdc"

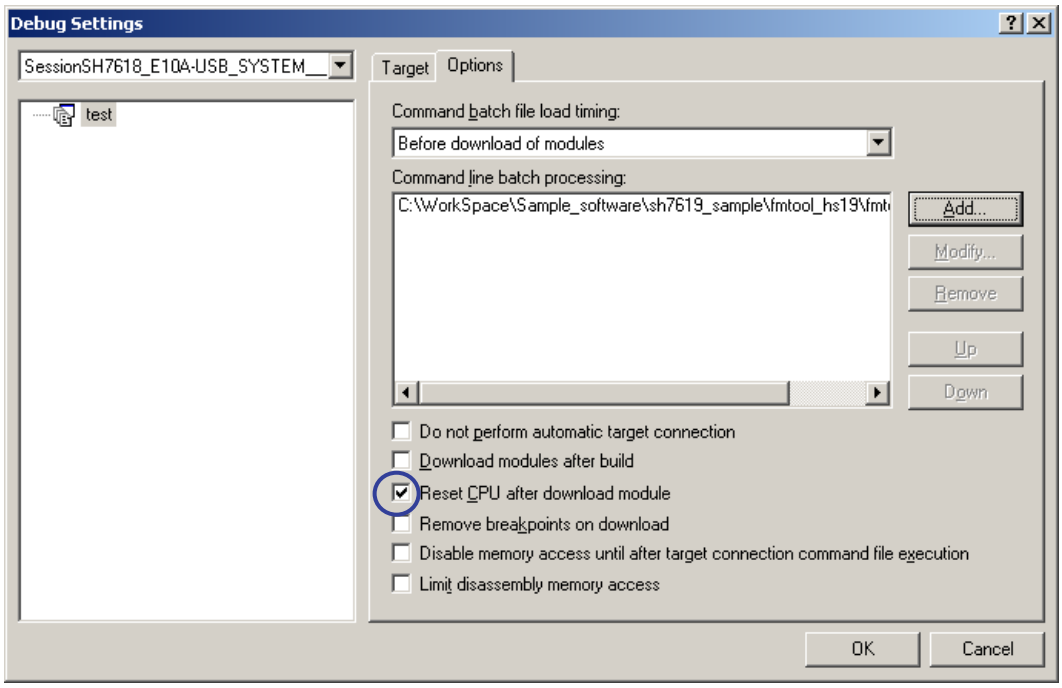

Figure5.2.2 [Debug Settings] Dialog Box

Note: The “Download modules after build” checkbox is selected as default. However, clear this checkbox, and select “Reset CPU after download module”, as shown above.

5.2.3 Activate the Command Line Window

Select [View] menu → [Command Line] to open the [Command Line] window.
When downloading the load modules, activate the [Command Line] window to check whether the script file is executed.

Note: If the script file is not executed, downloading the load modules into the flash memory cannot be completed.

5.3 Add/Modify Hardware Setup Files

To operate the software on the M3A-HS19 CPU board, the hardware-dependent part of the M3A-HS19 must be set up.
Add or modify the M3A-HS19 hardware setting of the standard source files, which are automatically generated when you created a new project. Following describes how to add or modify the hardware setup files.

The hardware dependent setting means the access timing setting to the external memory (flash memory and SDRAM), operating clock setting, and cache memory setting.

5.3.1 Copy Hardware Setup Files

Copy the “HardwareSetup” directory stored in the CD-ROM into the new project workspace directory "C:¥WorkSpace¥test", created in 5.1.
The explanation given below assumes that the hardware setup files are stored in "C:¥WorkSpace¥test¥HardwareSetup" directory.

5.3.2 Remove the Standard Source Files

(1) Select [Project] -> [Remove Files...].

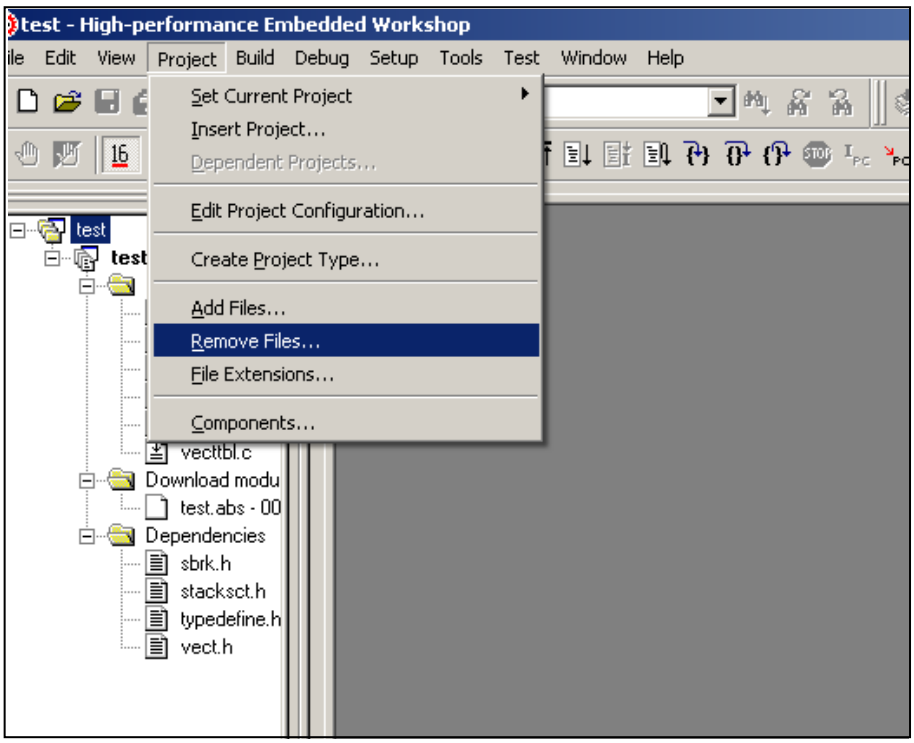

Figure 5.3.1 Remove Files (1/2)

(2) Select “dbsct.c”, "intprg.c", "resetprg.c", “sbrk.c”, and "vecttbl.c" files from the [Remove Project Files] dialog box, and click ”Remove”.

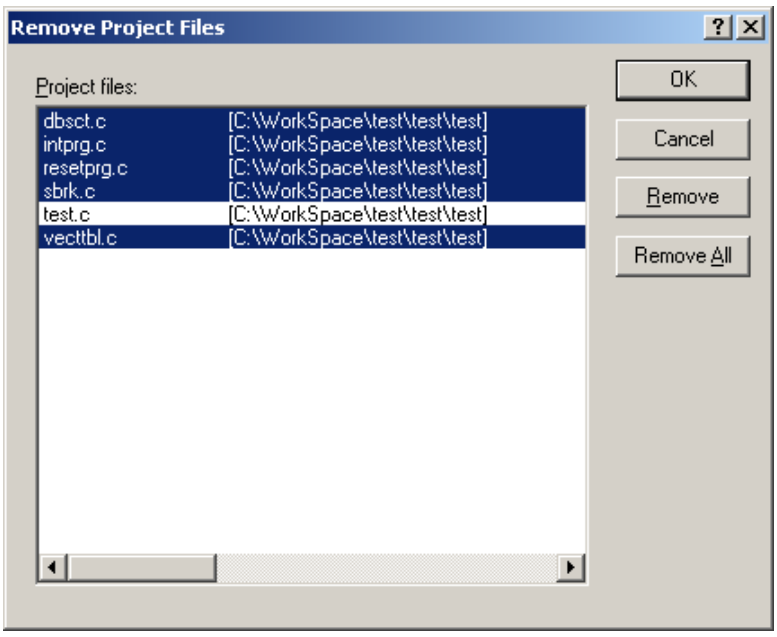

Figure 5.3.2 Remove Files (2/2)

5.3.3 Add Hardware Setup Files

(1) Select [Project] -> [Add Files...].

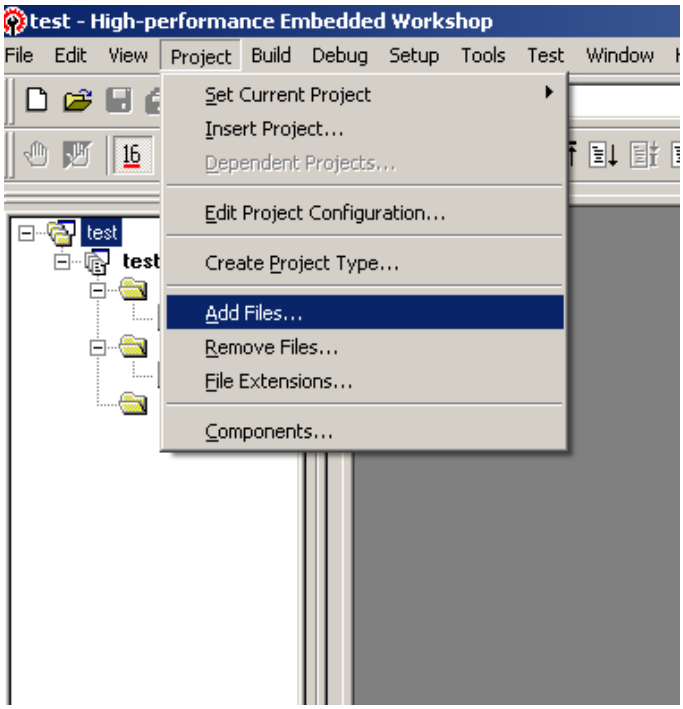

Figure 5.3.3 Add Files (1/3)

(2) From the copied hardware setup files "C:¥WorkSpace¥test¥HardwareSetup" directory, add the files listed below.

"bsc.c", "cache.c", "cpg_init.c", "dbsct.c", "hwsetup.c", "intprg.c", "lowsrc.c",
"resetprg.c","sbrk.c", "siochar.c", "vecttbl.c"
(Select the "Relative Path" checkbox)

Select the [Relative Path] checkbox

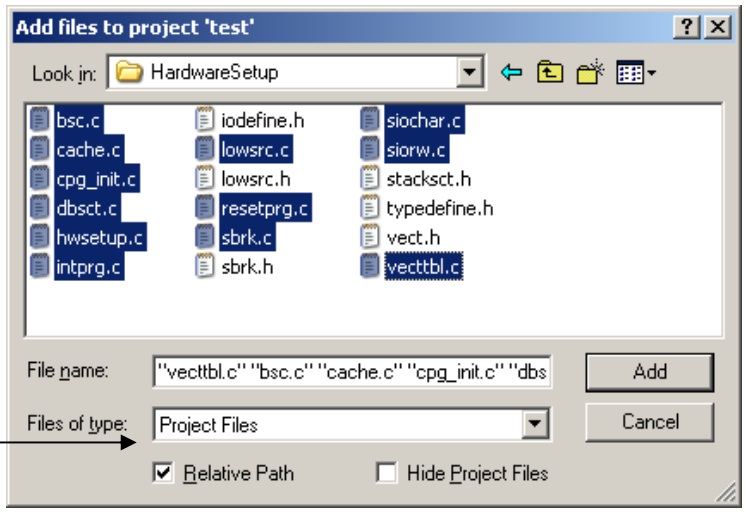

Figure 5.3.4 Add Files (2/3)

(3) Confirm that the files have been added as shown below.

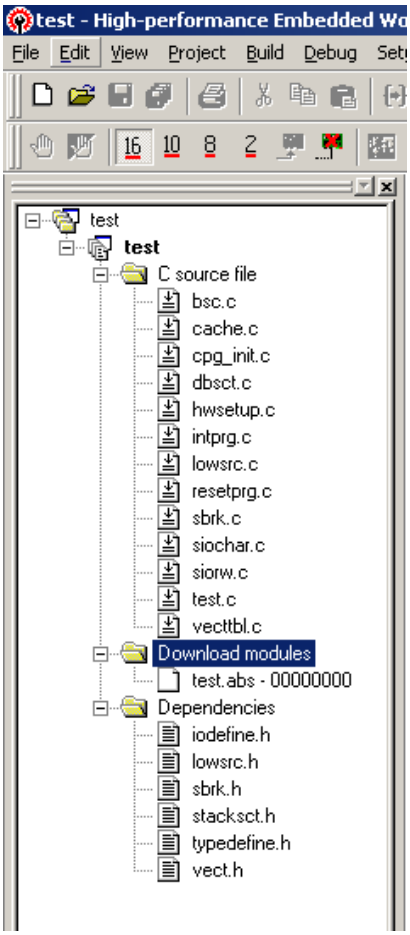

Figure 5.3.5 Add Files (3/3)

5.3.4 Set Compiler Options

Select [Build] menu, open the [SuperH RISC engine Standard Toolchain] dialog box -> [C/C++] tab. Set “Category”, “Show entries for” and “Option C/C++” as appropriate.
For details on how to set “Option C/C++”, refer to the SuperH RISC engine C/C++ Compiler, Assembler and Optimizing Linkage Editor User’s Manual.

The installation in this manual assumes that the M3A-HS19 hardware-dependent include file is stored in another directory (default: project directory), the Relative path to the include file directory must be added.

- Project directory (default): "C:¥WorkSpace¥test¥test"
- Directory stores the include files: "C:¥WorkSpace¥test¥HardwareSetup"

Steps to set a Relative path to the include file directory are shown as follows.

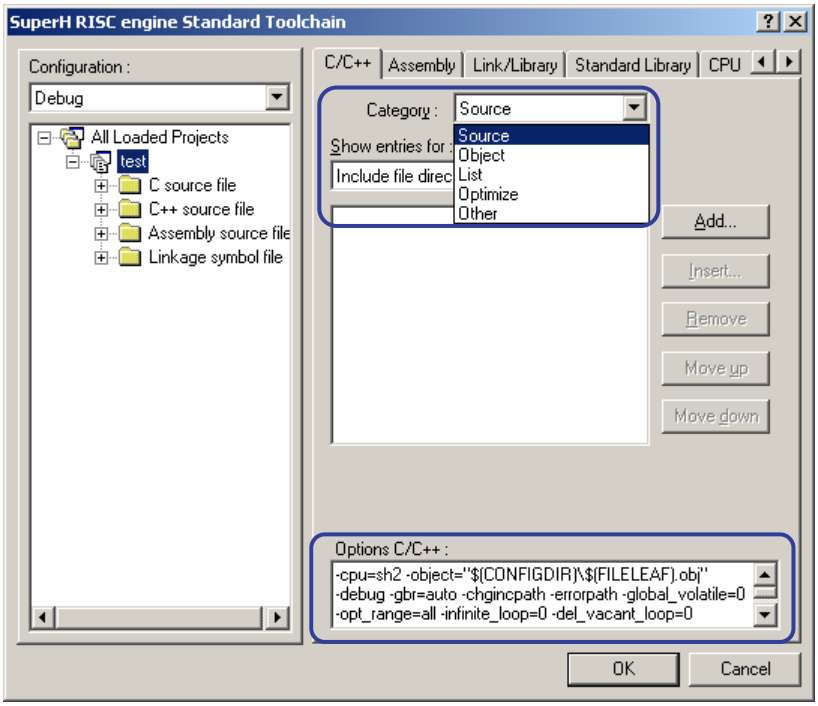

Figure 5.3.6 [Compiler Option Setup] Window

(1) Open the [SuperH RISC engine Standard Toolchain] dialog box → [“C/C++”] tab, set up as following, then click ”Add...”.
- Category: Source
- Show entries for: Include file directory

(2) Open the [Add include file directory] dialog box, set up as shown below, and click ”OK”.
- Relative to: Select “Workspace directory” from the drop-down list.
- Sub-Directory: Enter “HardwareSetup” in the text box.

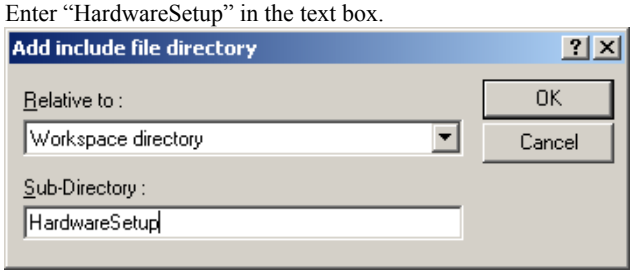

Figure 5.3.7 [Add include file directory] Dialog Box

5.3.5 Set Link/Library

Select [Build] menu, open the [SuperH RISC engine Standard Toolchain] dialog box, and select the [Link/Library] tab. Set ”Category”, “Show entries for”, and “Option Link/Library” as appropriate.

For details on how to set optimization linker options, refer to the SuperH RISC engine C/C++ Compiler, Assembler and Optimizing Linkage Editor User’s Manual.

This section describes how to change section setting.

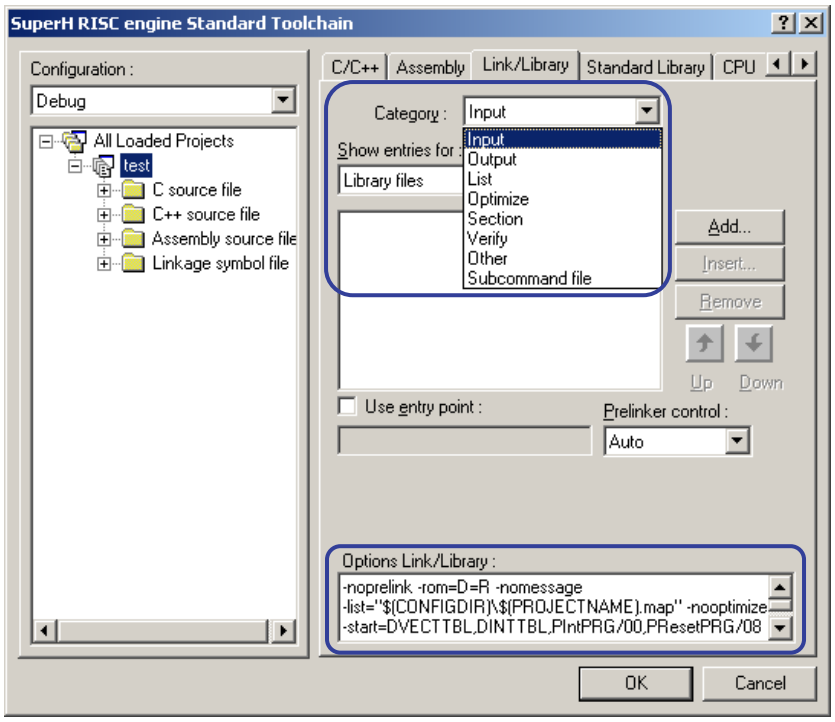

Figure 5.3.8 [Link/Library Setup] Window

(a) Section modification example (using the cache memory setting function)

To use “io.init.cache function (cache memory setting)”, the section must be allocated to CS0 cache-disabled space. Followings are the steps to allocate the section to the CS0 cache-disabled space. For the details of the cache memory, refer to SH7619 Hardware Manual (Cache and BSC).

(1) Select [Build] menu, → open the [SuperH RISC engine Standard Toolchain] dialog box, and select the [Link/Library] tab. Set following items as below, and click “Edit”.

• Category: Section

• Show entries for: Section

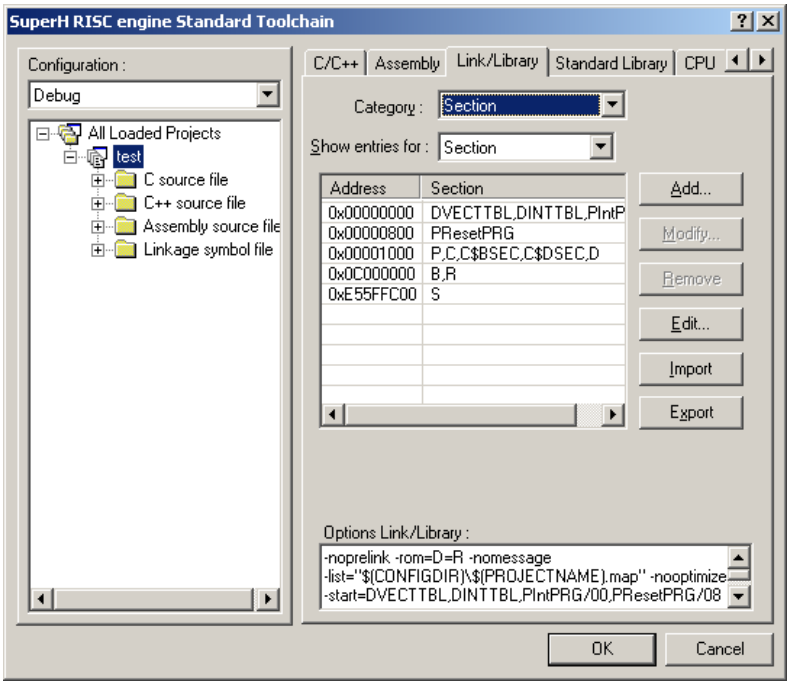

Figure 5.3.9 Section Setting (1/6)

(2) The [Section] dialog box will appear. Click ”Add…”.

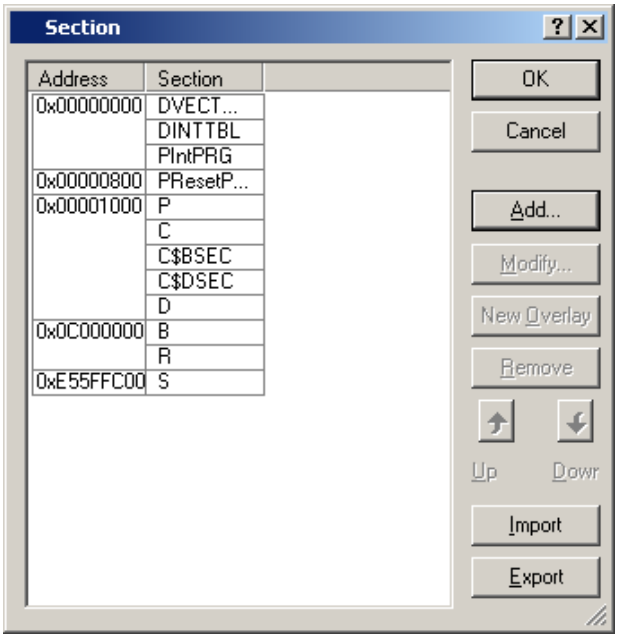

Figure 5.3.10 Section Setting (2/6)

(3) The [Section address] dialog box will open. Enter "0xA0000600" in the [Address] as shown in Figure 5.3.11 and click ”OK“.

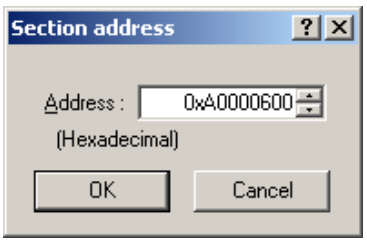

Figure 5.3.11 Section Setting (3/6)

(4) The Section address is added, and the display returns to the [Section] dialog box. Select the blank space of Section as shown in Figure 5.3.12 and click ”Add…”.

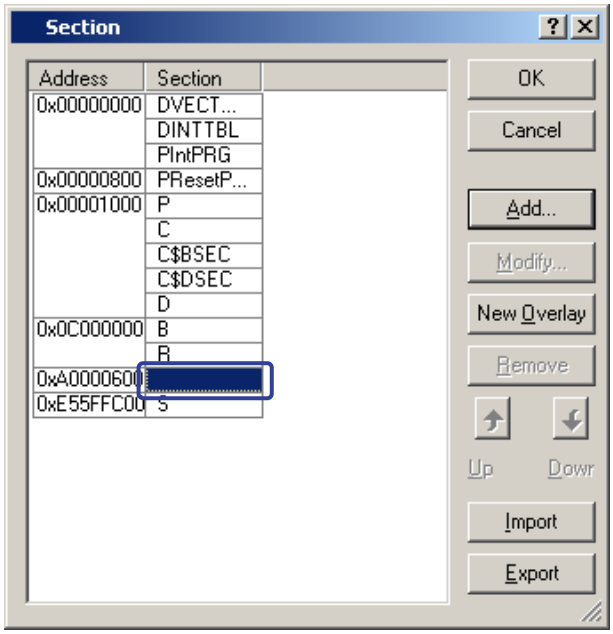

Figure 5.3.12 Section Setting (4/6)

(5) The [Add section] dialog box will open. Enter “PCACHE “in the [Section name] as shown in Figure 5.3.13 and click ”OK”. The [CACHE] section is defined in the “cache.c” source file. The first character “P” stands for P section.

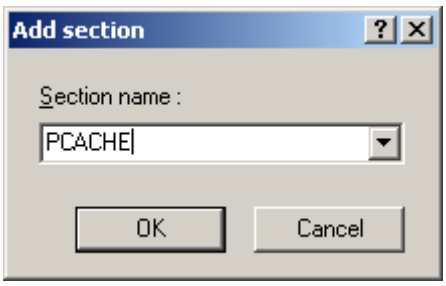

Figure 5.3.13 Section Setting (5/6)

(6) The section name is added, and the display returns to the [Section] dialog box. Confirm if the section has been set as shown in Figure 5.3.14, and click ”OK”.

The display returns to the [SuperH RISC engine Standard Toolchain] dialog box, and click ”OK“ to complete the setting.

Allocate to the CS0 cache-disabled space

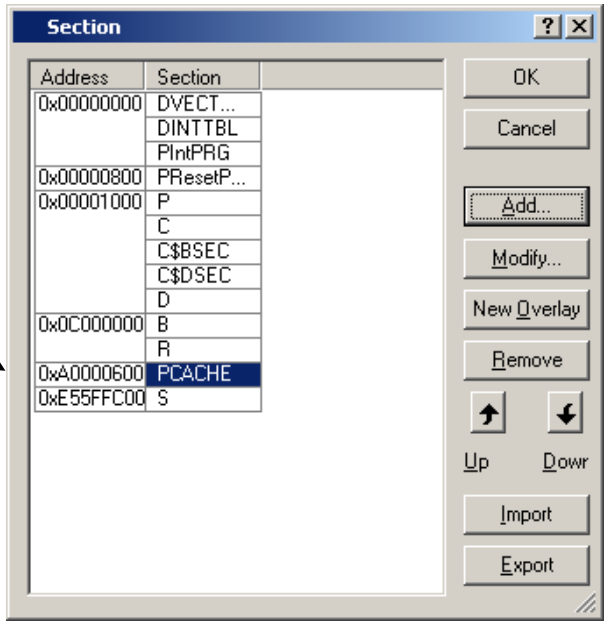

Figure 5.3.14 Section Setting (6/6)

(b) Section modification example (Changes section B to the on-chip RAM area)

Following shows an example for changing section B to the on-chip RAM area.

For details on the section setting, refer to paragraph (a) above.

(1) In the [Section] dialog box, select section B, and click “Remove”.

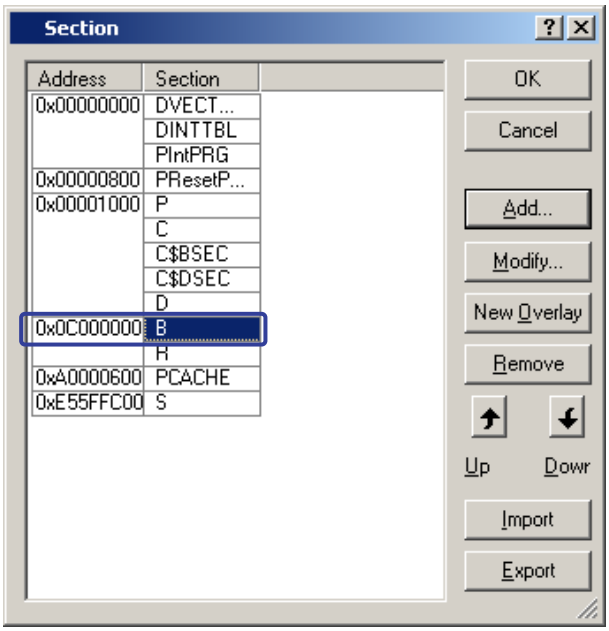

Figure5.3.15 Change Section (1/2)

(2) In the [Section] dialog box, set the section B to the on-chip RAM area shown in Figure 5.3.16.

Example: Changes the section setting for on-chip RAM area

- [Address]: 0xE55FC000
- [Section]: B

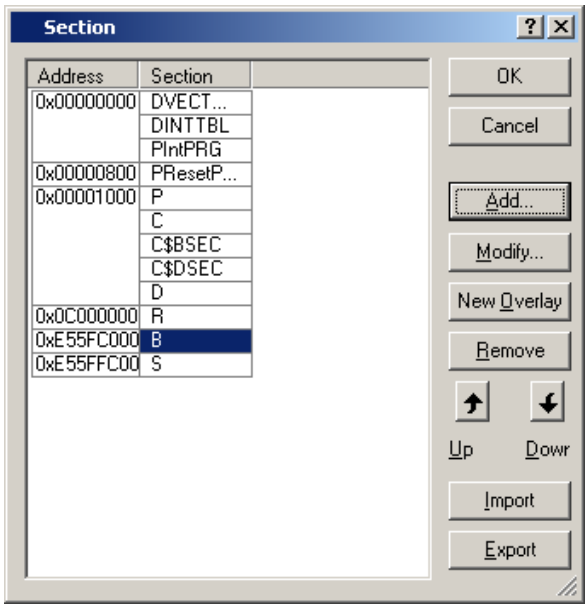

Figure 5.3.16 Change Section (2/2)

(c) Setting example (Transfers the vector table section DINTTBL to the on-chip RAM)

To accelerate the interrupt response speed, transfer the vector table to the on-chip RAM.

To transfer a vector table, set the Section of the vector table on the ROM as “DINTTBL”, the Section on the transfer destination RAM as “RINTTBL” in the file "dbsct.c" added in section 5.3.3 in this manual.

Section definition for vector table:

- Section name for vector table (ROM section): DINTTBL
- Transfer destination section name (RAM section): RINTTBL

Followings are steps to move the DINTTBL section from ROM to the on-chip RAM in the sample program.

(1) Set the RINTTBL section to on-chip RAM area in [Section] dialog box as shown in Figure 5.3.17.

“Address”: 0xE55FC000

“Section”: RINTTBL

Note: When setting the address as above, set the CPU Vector base register. This sample software sets the vector base register in the reset exception handling in the “resetprg.c” file.

Set section addresses of RINTTBL, B, and R to 0xE55FC000

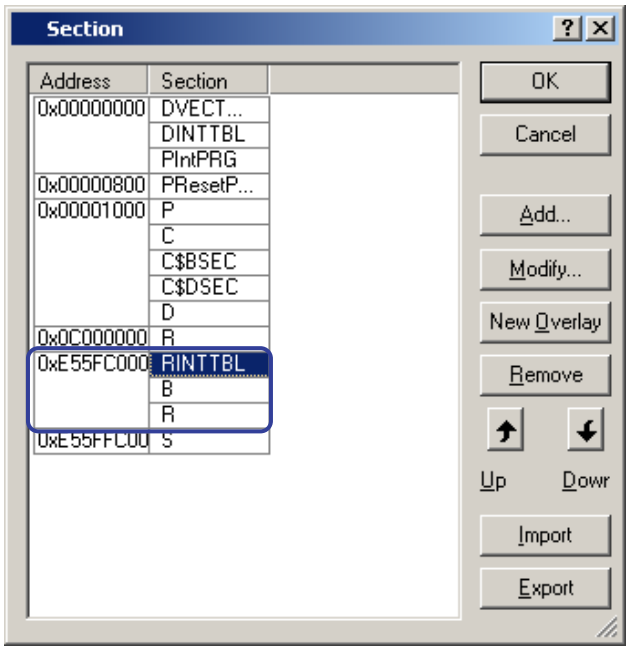

Figure 5.3.17 Change Section (1/3)

(2) Open the [Link/Library] tab and select the items as below, and click [Add].

• Category: Output

• Show entries for: ROM to RAM mapped sections

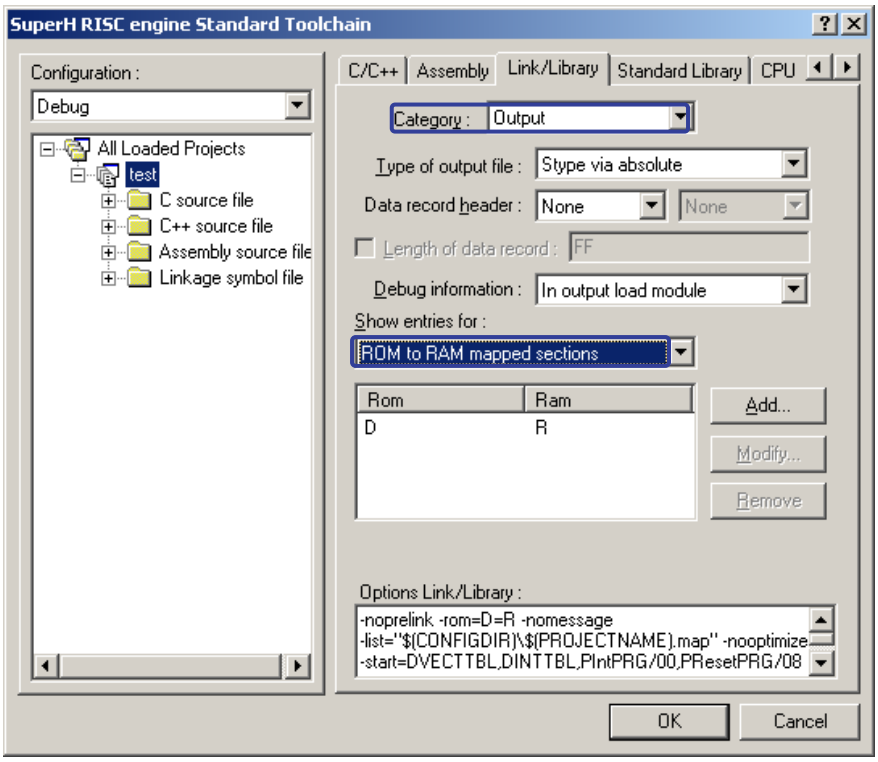

Figure 5.3.18 Change Section (2/3)

(3) Select the items as below in the [Add Rom to Ram] dialog box, and click ”OK”.

Return to the [SuperH RISC engine Standard Toolchain] dialog box and click ”OK“ to complete the setting.

• ROM section: DINTTBL

• RAM section: RINTTBL

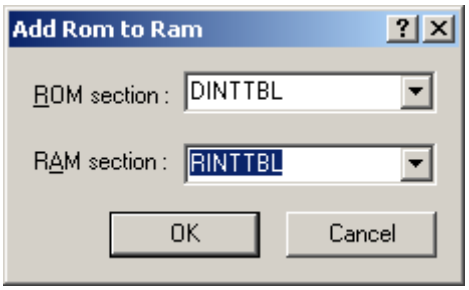

Figure5.3.19 Change Section (3/3)

5.3.6 Describe the Main Function (For Operation Check)

In the main function (test.c source file), describe the program to turn on the LED (LED1 on the M3A-HS19 is lit).

- Open the source file C:¥WorkSpace¥test¥test¥test.c with an editor, etc.
- Describe the following program to turn on the LED.

test.c - Notepad

File Edit Format View Help

```
/***********************************************************************/
/*                                                                     */
/*  FILE        :test.c                                                */
/*  DATE        :Wed, Jul 09, 2008                                     */
/*  DESCRIPTION :Main Program                                          */
/*  CPU TYPE    :SH7619                                                */
/*                                                                     */
/*  This file is generated by Renesas Project Generator (Ver.4.5).     */
/*                                                                     */
/***********************************************************************/


#include "iodefine.h"

void main(void)
{
     /==== Port setting ==== */
     PFC.PCCRL2.BIT.PC4MD = 0;          /* Set the pin as I/O port */
     PC.DRL.BIT..B4 = 0;                /* Set the data to light */
     PFC.PCIORL.BIT.B4 = 1;             /* Set the direction to output */
}
```

Figure 5.3.20 Program to turn on LED

(1) Create a new load module

Select [Build] menu -> [Build] to execute the build processing.

(2) Create a new load module (test.abs)

If a new load module ”test.abs” has been created, the hardware setup file addition or modification is now completed.

(3) Execute the program

Download the load module to execute the program. LED1 on the M3A-HS19 CPU board is now lit.

Revision History	SH7619 CPU Board M3A-HS19G50 Installation Manual

Rev.	Date	Description	
		Page	Summary
0.01	July 26, 2006	-	Preliminary edition issued.
1.00	July 11, 2008	-	Note regarding these materials revised, colophon moved and fixed typos.

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Renesas Electronics Corporation
1753, Shimonumabe, Nakahara-ku, Kawasaki-shi, Kanagawa 211-8668 Japan

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