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H8/300H Tiny Series E8 Emulator

Programming of On-Chip Flash Memory

Overview

As well as being employed in the debugging of user systems, the E8 emulator can also be used for programming the on-chip flash memory of microcomputers.

This document gives the procedure for starting up the E8 emulator in its programmer mode and for writing load-module data to flash memory.

The contents of this document are applicable to cases where a user system with an H8/300H Tiny-series microcomputer is used with an E8 emulator. Any H8/300H Tiny-series microcomputer can be used.

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1. Specifications

When the E8 emulator is started up in the programmer mode, it is only capable of writing user-program data to on-chip flash memory after any existing data in the flash memory has been erased. Since the on-chip flash memory does not contain a program for the E8, the user program cannot be debugged by using the E8 emulator. The load modules you wish to download must be registered in the workspace.

2. Functional Descriptions

The programmer mode is only useful for writing the user program to on-chip flash memory. This allows the user to check the operation of the user program. Since the on-chip flash memory does not contain a program for the E8, program operation must be verified without the aid of the E8 emulator.

This document gives the procedure for programming the on-chip flash memory with a sample program that is contained in the CD-ROM which comes with the E8 or is in the package downloaded from the Renesas website.

Product version: E8 Emulator Software V.2.09 Release 02

3. Software Preparation

3.1 Introduction

Expand the sample program (tutorial workspace) to be used with this document onto your personal computer by installing the software provided on the CD-ROM for the E8 emulator.

If the High-performance Embedded Workshop has already been installed on the personal computer where you are installing the software, some dialog boxes in the installation process may be skipped.

3.2 Installing the E8 Emulator Software

Execute HewInstMan.exe from the CD-ROM for the E8 emulator.

For details on installation, refer to the Introductory Guide for the E8 Emulator available on the Renesas website and follow the instructions displayed on the screen. The procedure is not described in this document.

3.3 Installing Other Necessary Software

- (1) The procedures in this document include the modification of part of the sample program before checking program operation. For this purpose, the H8S, H8/300 series C/C++ compiler package is necessary. If you already have the product version of the compiler package, install it.
- (2) If you do not have the product version of the compiler package, you can use a free evaluation version included in the CD-ROM which comes with the E8 emulator.

The evaluation version is also available from the Renesas website. From the top page of the Renesas site, go to [Support] -> [Software Download for Tools], select [Evaluation Software] from [Category:], and search for the H8S, H8/300 series C/C++ compiler package. For the address of the Renesas website, refer to section 5, Related Documents. For restrictions on usage and the procedure for installing the evaluation version of the compiler package, refer to the download page.

(3) If you select AutoUpdate Utility during the installation process, you can always find the latest version of the software on the Renesas website.



4. Operations

This section describes how to activate the High-performance Embedded Workshop (HEW) and how to use the flash-memory programming function in the following steps.



Figure 4.1 Procedure for Sample Program Execution

4.1 Activating the High-performance Embedded Workshop

Firstly, connect the E8 emulator (which is connected to the user system) to the host computer via a USB cable and check that debugging is possible.

Then, start up the High-performance Embedded Workshop by selecting [Start -> All Programs -> Renesas -> High-performance Embedded Workshop -> High-performance Embedded Workshop].





4.2 Opening a Workspace

(1) The [Welcome!] dialog box will appear on the High-performance Embedded Workshop window.

🖗 High-performance Embedded Workshop 📃 🗖
File Edit View Project Build Debug Setup Tools Test Window Help
Welcome! Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace Image: Create a new project workspace
Ready Find in Files À Macro À Test À Version Control /

Select the [Browse to another project workspace] radio button in the [Welcome!] dialog box and click on the [OK] button.





(2) The [Open Workspace] dialog box will appear.

Open Works	space ?X
Look in: 隘	Tutorial 💽 🗢 🗈 📸 🗐
	NY_SLP_E8H8_SYSTEM
Tutorial.hv	
File name:	Select
Files of type:	HEW Workspaces (*.hws)

If the software from the CD-ROM for the emulator has been installed, the workspace "Tutorial.hws" will be in the folder shown below (standard location). Specify the correct location by opening the folders in order. Select the workspace "Tutorial.hws" and click on the [Select] button.

C:¥WorkSpace¥Tutorial¥E8¥H8¥Tutorial¥Tutorial.hws
C:¥WorkSpace
└Tutorial
LE8
LH8
└Tutorial
[∟] Tutorial.hws

Note: The above directory will not be specifiable for some earlier versions of the High-performance Embedded Workshop. In this case, select the directory indicated below.

<High-performance Embedded Workshop installation directory>

¥Tools¥Renesas¥DebugComp¥Platform¥E8¥H8¥Tutorial

Examples:

C:¥hew3¥Tools¥Renesas¥DebugComp¥Platform¥E8¥H8¥Tutorial

C:¥hew2¥Tools¥Renesas¥DebugComp¥Platform¥E8¥H8¥Tutorial

(3) If the workspace was made with an old version of the High-performance Embedded Workshop, the following dialog box will appear. To update it to the new version, click on the [OK] button.

High-pe	rformance Embedded Workshop 🛛 🔀
1	The Workspace you are about to open was created with an earlier version of HEW. The data files for the workspace, projects and sessions will be updated. Once updated this workspace cannot be opened by an older version of HEW. Backup versions of your old files will be created in the workspace and project directories with the prefix 'old_version_xxx'. Do you wish to continue ?
	OK Cancel



(4) If the [Toolchain Version Not Registered in System] dialog box appears, select the name of the target project and click on the [OK] button.

Toolchain missing	×
Toolchain 'Hitachi H8S,H8/300 Standard Toolchain', version '6.0.0.0' is missing from the following project(s). Select projects for upgrade.	
Tutoria	
OK Cancel	

(5) If the [Changing Toolchain Version] dialog box appears, select the desired toolchain version and click on the [OK] button.

Change Toolchai	n Version		? 🔀
Toolchain name: Current version: CPU Family: Toolchain:	Hitachi H8S,H8/300 St 6.0.0.0 H8S,H8/300 Hitachi H8S,H8/300 S		OK Cancel
Toolchain version: Toolchain build pha	6.1.2.0	•	>
Build phase H8S,H8/300 Asse H8S,H8/300 C/C- H8S,H8/300 C/C- OptLinker		Version 6.01.01 6.01.02 2.01.01 9.01.01	Information

(6) If the [Change Toolchain Version Summary] dialog box appears, just click on the [OK] button.

Change Toolchain Version Summary	
Summary :	
Project name : Tutorial	-
Hitachi H8S,H8/300 Standard Toolchain was upgraded 6.0.0.0 -> 6.1.2.0.	
	~
Generate Upgrade.txt as a summary file in the project directory	
ОК	



(7) After the workspace has been read, the [Emulator Setting] dialog box opens.

Emulator Setting	? 🗙
Emulator mode	
Device H8/3664F	
Mode C Erase Flash and Connect C Keep Flash and Connect Program Flash	
Power Supply Power Target from E8. (MAX 300mA) 3.3 V 5.0 V	
OK Ca	ancel

Select the name of the device in your user system from [Device]. In this example, "H8/3664F" is selected. For [Mode], select [Program Flash]. Then, make settings for [Power supply] that fit your system. In this example, [Power Target from emulator.] and [5.0V] are selected. Click on the [OK] button.

(8) The [System Clock] dialog box opens. Enter the value that agrees with the actual operating frequency of your system.



The system clock frequency in this example is 10.00 MHz.



(9) While the connection with the E8 emulator is being made, the [Connecting] information box shown below is displayed.



On completion of the connection, the entire on-chip flash memory will be in the erased state in readiness for programming.

For this reason, debugging is not possible while the E8 emulator is operating in the programmer mode; the only available operation is downloading of the load module into the on-chip flash memory. After programming of the flash memory has been completed, exit or restart the emulator.

(10)Connection of the E8 emulator is now complete, so operations in the High-performance Embedded Workshop screen can proceed.

🖗 Tutorial - High-performance Embedded Workshop
File Edit View Project Build Debug Setup Tools Test Window Help
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) 🖑 📧 🚹 💈 2 🍠 🧖 🚾 🙌 🔤 🛛 🛱 🖬 🗊 🖓 🖓 🖓 🍩 🎭 🦕 🛛 💷 📮 📨 🐺 💭 🚱 👦
Itorial Assembly source file Strk.h strk.ch Strk.c Strk.c S
A OL OT AL AT 1 21 21 00 10 II 2 2
Connected
Eliz Accord Anno Anno Anno Anno Anno Anno Anno Ann
Build Debug / Find in Files Macro Test Version Control /

Now that the E8 emulator has been successfully connected, "Connected" appears in the [Debug] tabbed page in the [Output] pane.



- 4.3 Viewing the Memory Map (Building)
- (1) Select [Map] from the [View] menu.

Tutorial - High-performance Embedde	d Workshop
File Edit View Project Build Debug Setup	
Differences	🏹 💽 🟘 🔏 👔 🥙 🛗 📇 🚺 Debug_Tiny_SLP_E8H8_🔽 Sessiontiny_slp_e8h8_syst 💌
Command Line Ctrl+L	🖬 🗄 🖬 🕼 🚱 🚱 🐨 🔍 🔍 🔍 💷 🖓 🚱 😨 🚱
TCL Toolkit Ctrl+Shift+K	
E	
Dutput Alt+O	
Disassembly Ctrl+D	
<u>PU</u>	
E Symbol	
Code	
Graphic Sort cpp Utorial cpp Owwnload modules Tutorial abs - 0000000 Call Dependencies	
🔄 📴 Pr 📓 T 🔍 N 🚺 Test	
🕺 01 01 AL AT 😫 🕸 🖉 🗈 🖬	?
Connected	ro λ Test λ Version Control /
Open map window	INS INS

(2) The [Select Map Window Type] dialog box opens. Select [Map Section Information] and click on the [OK] button.





(3) The [Map Section Information] tabbed page shows information on the sections.

🖗 Tutorial - High-performance Embedded Workshop - [Map Section Information]
🤣 File Edit View Project Build Debug Setup Tools Test Window Help 📃 🗗 🗙
📗 🗅 😂 🗟 🐇 ங 🖻 🕒 🕖 🎇
] ① 11 12 12 12 12 12 12 12 12 12 12 12 12
Image: Start Address Image: Start Address Image: Start Address
Image: Section and Sectio
Supervision Control
Ready III III Default1 desktop IN5 NUM

In the initial state set up by the sample program, information on the addresses where sections start and end is not included. Make a setting to enable the output of this information in the following steps (4 to 6) before proceeding with the building process.

(4) Select [H8S,H8/300 Standard Toolchain] from the [Build] menu.

🏟 Tutorial - High-performance Embedded Workshop - [Map	Section Information]
A File Edit View Project Build Debug Setup Tools Test Wind	ow Help _ = = ×
🛛 🗅 😂 🗟 🦉 🧧 💶 H85,H8/300 Standard Toolchain	🗩 🏘 🥁 🗒 🥙 🕮 📇 🚺 Debug_Tiny_SLP_E8H8_: 🗸 Sessiontiny_slp_e8h8_syst 🗸
□ □ □ □ □ ■ € © Duild Ele Ctri- □ ① 10 8 2 ■ Build All ■ Build All ■ □ <t< th=""><th>⊧F7 F7 8• 69• @□ I₂c ‰ E1 ⊊1 20 목4 [27 20 목4 [26 190 </th></t<>	⊧F7 F7 8• 69• @□ I₂c ‰ E1 ⊊1 20 목4 [27 20 목4 [26 190
Build Multiple Clean Current Project Clean All Projects Date of the addr file Date of the addr file	Image: Setting Name Start Address End Address
Stork.h Stork Storp Tool Execution Ctrl+Br Storksct.tr Cource file Storksct.tr Cource file Storksct.tr Build Phases	eak c, c & BSEC, c & INIT, D
Image: Spik.c Build ⊆onfigurations Image: Spice Spic	
□ Tutorial.abs - 0000000 □ ♣ FF00 □ Dependencies □ ♣ Stik.h □ ♥ Pr 월 T ● N ♥ Test □ Map Section	
× 01 01 ▲1 ▲1 \$1 \$1 Ø = . ?	
Connected ↓ Build & Debug ∧ Find in Files → Macro → Test → Version	Control /
	III III Default1 desktop



(5) Open the [Link/Library] tabbed page and select [List] from [Category].

HBS,HB/300 Standard Toolchain	. ? 🔀
Configuration : Debug_Tiny_SLP_E8H8_SYST All Loaded Projects All Loaded Projects C source file C++ source file C++ source file C++ source file C++ source file C++ source file C++ source file	C/C++ Assembly Link/Library Standard Library CPU ↓ ↓ Category : Input Show entries for Duent Library files List Optimize Section Verify Other Subcommand file Remove Down
<	Use entry point : Prelinker control : Auto Options Link/Library : noprelink -rom=D=R -nomessage -nooptimize -start=PResetPRG/0400,P,C,C\$DSEC,C\$BSEC,C\$INIT,D /01000,Psam/01C00,Bheap/0FB80,B,R/0FD80,S/0FF00
	OK Cancel

(6) Select the [Generate list file] checkbox and click on the [Enable All] button to enable all entries. Then click on the [OK] button.

H8S,H8/300 Standard Toolchair	ı
Configuration : Debug_Tiny_SLP_E8H8_SYST All Loaded Projects Tutoria C Source file C C++ source file Assembly source file Linkage symbol file	C/C++ Assembly Link/Library Standard Library CPU Category : List Contents : Show symbol Enable all Show reference Show section Disable all Contents Contents
	Options Link/Library : -noprelink -rom=D=R -nomessage -list="\$(CONFIGDIR)\\$(PROJECTNAME).map" -show=symbol,reference,xreference -nooptimize



(7) Select [Build] or [Build All] from the [Build] menu.

Tutorial - High-performance Embedded Workshop - [Map Section]	Information]	
🌮 File Edit View Project <mark>Build</mark> Debug Setup Tools Test Window He)	_ @ ×
🗋 🖸 😂 🛃 🏉 🛃 🕺 H85,H8/300 Standard Toolchain	🖣 🐴 🖓 🗒 🏙 🛗 👗 🛛 Debug_Tiny_S	LP_E8H8_{ Sessiontiny_slp_e8h8_syst 💌
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≌ tutorial.cp Download mod		I
Tutorial abs - 000000 Dependencies Strich Strich Map Section	٢	

(8) Upon completion of the build, the [Confirmation Request] dialog box appears to request confirmation that data is to be downloaded to the flash memory. At this stage, select [No] or [No To All].

P Tutorial - High-performance Embedo	led Workshop - [Map Section Information]		
A File Edit View Project Build Debug S	etup Tools Test Window Help		_ 6 ×
	₩ → ₩ & % © ⊞	🛗 👗 Debug_Tiny_SLP_E8H8_(💌	Sessiontiny_slp_e8h8_syst
0 10 1 <u>6</u> 10 8 2 9 9 10 t	↓ 🔤 1=1 ≣1 ≣1 ≣1 €) 60 69 69 1 _{Pc} ≯c [a 🗊 💴 🛱 🔤 🕅 🛱	
Tutorial) E	
Assembly source file	🖻 🖾 Linker section setting 📃	Name Start Address 🔺	End Address
🖻 🔄 Cheader file	e 💑 0400	\$v 0000	0001
sbrk.h	PResetPRG	PR 0400	0423
stacksot.h	🖻 💑 1000	P 1000	14E9
🖃 🔄 C source file Confirmation	n Request	? 🔀	14EB 14F1
_≝ dbsct.c			14F1 14F5
Sbrk.c ↓ OK to a	download module: C:\WorkSpace\Tutorial\E8\H8\Tutorial\Debug_	Tiny_SLP_E8H8_SYSTEM\Tutorial.abs	1505
	🔽 Don't ask this question again		1000 1D19
sort.cpp	Yes No Yes to all No to a	all Cancel	FC03
tutorial.cpp		Caricar	FD85
Download modules	± 🖬 B,R 🗸	R FD86	FD95 🛛 🔽
Tutorial.abs - 0000000 -		<	>
Pr T N 7 Test	Map Section		
N 01 01 AL AT 1 21 21 0 10 10	2		
Ī			~
Build Finished			_
O Errors, O Warnings			
			×
Build (Debug) Find in Files) M	lacro λ Test λ Version Control /		>
Ready	💷 🔝 🔝 Default1 desktop		INS NUM

Details of the build as it is executed are shown on the [Build] tabbed page of the [Output] pane. When an error has occurred in building, automatic downloading will not proceed.

In this example, automatic downloading has been canceled because the example of programming is to be introduced after the map information has been confirmed. If you are already sure that the data will be programmed correctly, you can select [Yes] or [Yes To All] to download the data to the flash memory.



(9) Various information is shown, including the addresses where the sections start and end.

Tutorial - High-performance E	mbedded Workshop - [Map Section Information]						
◇ File Edit View Project Build Debug Setup Tools Test Window Help							
] D 🛩 6 <i>6</i> 6 % h e	┍┍┍ ┝ ┠ ┠ ┠ ┠ ┠ ┠ ┠ ┠ ┠ ┠ ┠ ┠ ┠ ┠ ┠ ┠ ┠	© 🛱 🖽 Ă	Debug_Tiny_SLP_E8H8	Sessiontiny_sl	p_e8h8_syst 💌 🥕		
		- IV	In .				
0 🕅 16 10 8 2 🛒 🚆	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	*PC 🛛 🕅 💭	100 🛱 🖉 🎘	2 💀 📴			
	B # # * * * * * * * * *	0 E					
Assembly source	🗆 🖼 Linker section setting	Name	Start Address 🔺	End Address	Size C		
🖻 🔄 C header file	🖻 🚠 0400	\$VECTO	0000	0001	00000002		
sbrk.h	PResetPRG	PResetPRG	0400	0423	00000024		
sort.h	🖹 🖻 💑 1000	Р	1000	14E9	000004ea		
□	🖭 🚟 P,C,C\$DSEC,C\$BSEC,C\$INIT,D	c	14EA	14EB	00000002		
dbsct.c	⊟ & 1c00	C\$DSEC	14EC	14F1	00000006		
	- Psam	C\$BSEC	14F2	14F5	00000004		
🖻 🔄 C++ source file	B 680	D	14F6	1505	00000010		
resetprg.cpp	Bheap	Psam	1000	1D19	0000011A		
sort.cpp	FD80	Bheap	FB8O	FCO3	00000084		
tutorial.cpp		в	FD8O	FD85	00000006		
Tutorial.abs -		R	FD86	FD95	00000010		
		s	FFOO	FF7F	00000080		
sbrk.h 👻		<					
	Map Section						
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					<u>~</u>		

Sort the [Start Address] values in ascending order; we can see that the area of flash memory where the ROM-attributes data are to be stored ends at 1D19.

4.4 Programming the Flash Memory

(1) Select the [Debug] tab. The active tabbed page in the [Output] pane is changed from [Build] to [Debug].





(2) Right-click on the name of the load module under [Download modules] in the workspace tree and select [Download] from the popup menu. Downloading can also be initiated by double-clicking on the file name.

🛞 Tutorial - High-performa	iance En	nbedded Workshop - [Map !	Section Information]					
🔗 File Edit View Project Build Debug Setup Tools Test Window Help 🛛 🗕 🛪								
▋◘ ☞ ◙ ₫ ₫ ¾	Pa 🖪	(+) [4	■ #↓ # %]	👂 🏙 📇 👗	Debug_Tiny_SLP_E8H8	Sessiontiny_slp	_e8h8_syst 💌 🥕	
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	P	🚾 🕂 🔤 🗍 🗄 🔛	🗈 🕑 🖓 🖓 💷 🖓	: 🛛 🖪 💭	10 🛱 🖉 🕅	2		
		🕑 🖉 🖉 🗛 🗛 🗸		F				
	e	🖃 🚟 Linker section	setting	Name	Start Address 🔺	End Address	Size C	
🖃 🔄 C header file		🖻 💑 0400		\$VECTO	0000	0001	00000002	
sbrk.h		PResetPRG		PResetPRG	0400	0423	00000024	
sort.h		🖻 💑 1000		P	1000	14E9	000004EA	
ingentation in the stack set.h		E B P.C.C\$DSEC	C,C\$BSEC,C\$INIT,D	с	14EA	14EB	00000002	
⊡		E 💑 1c00	-, , , -	C\$DSEC	14EC	14F1	00000006	
li⊒ absecce ⊥⊥ sbrk.c		Psam		C\$BSEC	14F2	14F5	00000004	
E C++ source file				D	14F6	1505	00000010	
resetprg.cpp	P	Bheap		Psam	1COO	1D19	0000011A	
- 🖹 sort.cpp				Bheap	FB8O	FCO3	00000084	
🖆 tutorial.cpp ⊡ 🔄 Download modu				в	FD8O	FD85	00000006	
				R	FD86	FD95	00000010	
🖃 🔄 Dependel 🐋	<u>D</u> ownlo-	ad		S	FFOO	FF7F	08000000	
sbrk.h	Downlow	d (Dobug Data Qala)		<			>	
	Unload							
- 🔄 📑 🕥 [_							
		ad A <u>N</u> ew Module						
	<u>R</u> emove							
Connected	Debug (5ettings						
	Configu	ra Viani						

(3) Upon completion of downloading, a message box containing the text "Sum data"* and "Flash memory writing OK." appears. Read the messages and click on the [OK] button.



Programming of the flash memory is now complete. Click on the [OK] button.



Since the on-chip flash memory does not contain a program for the E8, debugging is not possible. If debugging is attempted, the following error message box appears.





*Note: [Sum data] is the 4-byte sum of all bytes of data in the flash-memory area (excluding on-chip RAM and reserved areas) of the microcomputer in use. Since the whole flash-memory area was erased on connection of the E8, regions to which no data were written by downloading hold the default value, 0xff.

When the H8/3664F is in use, the range from H'0000 to H'7FFF will be the target area. If the microcomputer in use is equipped with a dedicated ROM area for use by the E8, this area will also be included. When the H8/3672F is in use, for example, the range from H'0000 to H'4FFF will be the target area. The addresses of such ROM areas may not be recorded in the hardware manual (e.g. for the H8/36049F).

In such case, refer to the E8 Emulator Additional Document for User's Manual, which provides specific information on the individual microcomputers.

(4) While the flash memory is being programmed, the [Debug] tabbed page in the [Output] pane shows the message "Flash memory writing ...". When programming is completed, a downward-pointing arrow appears on the icon of the load-module file in the workspace.



In this example, we will use the [Disconnect] and [Connect] toolbar buttons to restart the E8 so that we can continue to use it.

Click on the [Disconnect] button.



- 4.5 Writing Data into the Areas Occupied by the Emulator
- (1) To start connection of the E8 emulator, click on the [Connect] toolbar button.

Tutorial - High-performance En	nbedded Workshop - [Map Section Information]				
🥪 File Edit View Project Build Deb	oug Setup Tools Test Window Help				_ 8 :
D ₽80 8888	⊕ फ़	ک 🖽 🏙 🐇	Debug_Tiny_SLP_E8H8_		o_e8h8_syst 💌 🧪
) FILED 7) 7 (? 🚥 I _{rc} *	c			
Tutorial	P # # * * * * * * * * * *	B			
Assembly source	🖃 🚟 Linker section setting	Name	Start Address 🔺	End Address	Size C
🖃 🔄 C header file	🖻 💑 0400	\$VECTO	0000	0001	00000002
sbrk.h	PResetPRG	PResetPRG	0400	0423	00000024
sort.h	🖻 📲 1000	P	1000	14E9	000004EA
stacksct.h	🗄 🔡 P,C,C\$DSEC,C\$BSEC,C\$INIT,D	c	14EA	14EB	00000002
⊡⊟ C source file		C\$DSEC	14EC	14F1	00000006
i abscc.c ≝] sbrk.c	Psam	C\$BSEC	14F2	14F5	00000004
E C++ source file		D	14F6	1505	00000010
Iresetprg.cpp	🖻 💑 FB80	Psam	1COO	1D19	0000011A
sort.cpp	🔓 Bheap	Bheap	FB80	FCO3	00000084
🔛 🔛 tutorial.cpp	🖻 💑 FD80	в	FD80	FD85	00000006
🔤 Download modul		R	FD86	FD95	00000010
		s	FFOO	FF7F	00000080
sbrk.h ■ sort.h	S S	<			>
🔄 🔄 🚺	Map Section				
Connected Flash memory writing Disconnected	s 👌 Macro 👌 Test 👌 Version Control 🏅				
leady		aulti desktop		IN:	5 NUM

(2) As in the previous connection, select [Program Flash] as the emulator mode.

Emulator Setting	? 🗙
Emulator mode	
Device H8/3664F	
Mode C Erase Flash and Connect	
C Keep Flash and Connect	
Program Flash	
Power Supply	
Power Target from E8. (MAX 300mA)	
© 3.3V 💽5.0V	
ОКС	ancel
🔽 Do not show this dialog bo	x again.

All other settings must be the same as in step (7) of section 4.2.

In the subsequently opened [System Clock] dialog box, select "10.00" as well as in step (8) of section 4.2.



(3) Now the start address of a section should be changed. Select [H8S, H8/300 Standard Toolchain] from the [Build] menu.

🌮 File Edit View Project	mance Embedded Workshop - [Build Debug Column Tools Tools	Window He					
D 🛎 B 🖉 🖉 🗲	H85,H8/300 Standard Toolchain		PM & % :	\$ 🖽 🖽 👗	Debug_Tiny_SLP_E8H8_		o_e8h8_syst ▼ 📝
D 🖽 🗞 🗔 d 4	≫ Build Eile ﷺ Build ∰ Build All	Ctrl+F7 F7	ው (ዮ 💿 I _{PC} ኑ	c R1 💭	100 FF F	a 🗗 🖻	爾
⊡	Build <u>M</u> ultiple Clean Current Project Clean All Projects			E.	Start Address 🔺	End Address	Size C
Assembly sour ⊡ C header file sbrk.h	Update All Dependencies	trl+Break	-	\$VECTO PResetPRG	0000	0001 0423	00000002 00000024
sort.h ☐ stacksct.h □ - ── ☐ stacksct.h			SEC,C\$INIT,D	P C	1000 14EA	14E9 14EB	000004EA 00000002 00000006
- 말 dbsct.c - 말 sbrk.c =──국 C++ source fil	Build Phases Build Configurations		-	C\$DSEC C\$BSEC D	14EC 14F2 14F6	14F1 14F5 1505	00000000 00000004 00000010
말 resetprg.c 말 sort.cpp 말 tutorial.cp	Linkage Order		_	Psam Bheap	1000 FB80	1D19 FCO3	0000011A 00000084
Download mo	Generate Makerile			B R S	FD80 FD86 FF00	FD85 FD95 FF7F	00000006 00000010 00000080
- ■ sbrk.h				<	IIII		
OL OT AL AT 21 2	t 🖉 🖻 🖬 💡						
Disconnected Connected							
	Find in Files & Macro & Test & Ve	rsion Control	1				

(4) Click on the [Link/Library] tabbed page and select [Section] from [Category].

H8S,H8/300 Standard Toolchair	ı 🥐 🔀
Configuration : Debug_Tiny_SLP_E8H8_SYST All Loaded Projects Tutorial C source file C++ source file C++ source file Linkage symbol file	C/C++ Assembly Link/Library Standard Library CPU Category : Input Show entries for: Unput Library files Section Add Veniy Other Subcommand file Remove Up Down
×	Use entry point : Prelinker control : Auto Options Link/Library : -noprelink -rom=D=R -nomessage -list="\$(CONFIGDIR)\\$(PROJECTNAME).map" -show=symbol.reference.xreference -nooptimize
	OK Cancel



(5) Select the section whose address is 0x00001C00 and click on the [Modify] button.

H8S,H8/300 Standard Toolchair	n	? 🗙
Configuration :	C/C++ Assembly Link/Library Standard Library CPU	••
Debug_Tiny_SLP_E8H8_SYST	Category : Section	
E⊷ All Loaded Projects	Show entries for : Section	
⊕	Address Section Add	
	0x00000400 PHesetPRG 0x000001000 P;c;c\$DSEC;C\$DSEC C\$IN Modify	\supset
	0x000007500 Fisam 0x00007500 Sheap 0x0000FD80 B,R	
	0x0000FF00 S Edit	
	Import	
	Export	
	Options Link/Library : -noprelink -rom=D=R -nomessage -list="\$(CONFIGDIR)\\$(PROJECTNAME).map'' -show=symbol.reference.xreference -nooptimize	
	OK Car	ncel

(6) The [Modify section] dialog box opens. In this example, specify 0x00007C00 for [Address] and click on the [OK] button.

Modify section	? 🛛
Address : 0x00007C00 + (Hexadecimal	
Section : Psam	<
	OK Cancel

(7) Click on the [OK] button.

H8S,H8/300 Standard Toolchair	? 🛛
Configuration : Debug_Tiny_SLP_E8H8_SYST All Loaded Projects C source file C source file C++ source file Assembly source file Linkage symbol file	C/C++ Assembly Link/Library Standard Library CPU Category: Section Characteristics for: Section Address Section Address Section Address Section Add Add Add Add Add Add Add Add Add Beap Ox0000FB00 B,R Ox0000FF00 S Edit Import
	Cancel



(8) Select [Build] from the [Build] menu.

	n <mark>ance Embedded Workshop - [Map Sectio</mark> Build Debug Setup Tools Test Window He					
	H85,H8/300 Standard Toolchain	1	s 🏻 🖽 🗡	Debug_Tiny_SLP_E8H8_		
	Build F7					
0 🕅 16 10 8 2		🖓 🖓 🚳 I _{PC} ች	. 🛛 🗷 💭	10 🛱 🖉 🕅	A 🔁	
⊡	Build <u>M</u> ultiple Clean Current Project		F			
E 🕞 Tutorial	Cl <u>e</u> an All Projects Update All Dependencies	ing	Name	Start Address 🔺	End Address	Size C
⊡ ~ 🔄 C header file ⊡ 📄 sbrk.h	Update All Dependencies		\$VECTO PResetPRG	0000 0400	0001 0423	00000002
sort.h □ stacksct.h □ C source file	Include/Exclude Build	SEC,C\$INIT,D	P C	1000 14ea	14E9 14EB	000004EA 00000002
dbsct.c ≝ dbsct.c ≝ sbrk.c	Build Phases		C\$DSEC C\$BSEC	14EC 14F2	14F1 14F5	00000006
E-G C++ source file	Build Configurations		D Psam	14F6 1COO	1505 1D19	00000010 0000011A
≝ sort.cpp ≝ tutorial.cp	Lin <u>k</u> age Order ——————————————————————————————————		Bheap B	FB80 FD80	FCO3 FD85	00000084
Download mod	s- E- 💑 FF00	1	R S	FD86 FF00	FD95 FF7F	00000010
sbrk.h	►		<			
ē. <u>.</u> ē	Map Section					
	0 🖻 🖬 💡					
Disconnected Connected						<u> </u>

(9) Upon completion of the build, the [Confirmation Request] dialog box appears to request confirmation that data is to be downloaded to the flash memory. At this stage, select [Yes] or [Yes To All].





(10)Upon completion of downloading, a message box containing the text "Sum data" and "Flash memory writing OK." appears. Read the messages and click on the [OK] button.



A message box to inform that the programming has completed appears. Click on the [OK] button.



(11)Programming of the flash memory is now complete.



In this example, the E8 is writing data to the flash-memory area beyond address H'7000. Since the E8 emulator occupies the range from H'7000 to H'7FFF in the flash memory to control debugging, no program or data can usually be written to this range. In the programmer mode, however, the E8 is capable of programming the whole flash-memory area.

This allows the user to store a program whose size is equal to or smaller than that of the flash memory in the microcomputer and verify the user-system operation.

After programming of the flash memory has been completed, exit the E8 emulator software.

Note:

Debugging is not possible if the E8 emulator has programmed flash memory in the programmer mode because the flash memory does not contain a program for the E8. The user-system operation must be verified and evaluated independently of the E8.



(12)To check the current emulator mode, select [Setup -> Emulator -> Emulator Setting].

	nbedded Workshop - [Map Section Information]				
File Edit View Project Build Det □ □ □ □ □ □ □ □	🕑 Customize	\$ # # ×	Debug_Tiny_SLP_E8H8_		_ & × _e8h8_syst 💌 🥕
	Cortiant Views	ाला व्य	10 😝 🔊 🕅		
	<u>R</u> adix				
Tutorial	Emulator V V System		Start Address 🔺	End Address	Size C
□	D C400	\$VECTO PResetPRG	0000	0001 0423	00000002
sort.h	e 🔓 1000	Р	1000	14E9	000004EA
⊡ 🔄 C source file □ 🔛 dbsct.c	⊡-# P,C,C\$DSEC,C\$BSEC,C\$INIT,D ⊡-# 7COO	C C\$DSEC	14EA 14EC	14EB 14F1	00000002
⊡	- FB80	C\$BSEC D	14F2 14F6	14F5 1505	00000004 00000010
····· 当 resetprg.cpp ······ 当 sort.cpp	Bheap	Psam Bheap	7c00 FB80	7D19 FCO3	0000011A 00000084
⊡	⊡- # 0 FD80 ⊕- # 2 B,R	B R	FD80 FD86	FD85 FD95	00000006 00000010
□	- 6 FF00	S	FFOO	FF7F	00000080
sbrk.h		<			
	Map Section				

The [Emulator Setting] dialog box opens. The [Mode] section shows the emulator modes in gray. Check which radio button is currently selected.

Emulator Setti	ng ? 🔀
Emulator mode	
Device	H8/3664F
Mode	C Erase Flash and Connect
	C Keep Flash and Connect
<	© Program Flash
Power Supp	y
E Pow	ver Target from E8. (MAX 300mA)
	C 3.3V © 5.0V
	OK Cancel
	Do not show this dialog box again.

The picture shown above is an example where the current emulator mode is [Program Flash]. In this case, debugging by using the E8 is not possible.

While the E8 is connected, items shown in gray cannot be changed. Changing the current settings is only possible when the E8 is being started up.



- 5. Using the E8 as a Programmer
- (1) Select the [Create a new project workspace] radio button in the [Welcome!] dialog box opened at the startup of the High-performance Embedded Workshop.



(2) The [New Project Workspace] dialog box opens. Select [None] for [Tool chain] and enter the workspace name in the [Workspace Name] field. Then click on the [OK] button.

New Project Workspace		? 🔀
Projects		
Project Types Debugger only - H8 Tiny/Supe	Workspace Name: p1 Project Name: p1 Directory: C:\WorkSpace\p1 CPU family: uses up uses	Browse
Properties	H8S,H8/300 Tool chain: None	,
	ОК	Cancel

In this example, the workspace name is "p1".



(3) Select the target and click on the [Next] button.



(4) The [Setting the Debugger Options] dialog box opens. Keep the default setting and click on the [Finish] button.

Setting the Debugger Options	? 🛛
	Target name : H3 Tiny/SLP E8 SYSTEM 300H Configuration name : Debug_H8_Tiny_SLP_E8_SYSTEM_300H Detail options : Item Value Modify
< Back	Next > Finish Cancel

(5) The [Project Summary] dialog box appears. Click on the [OK] button.

Summary 🛛 🛛 💽 🔀
Project Summary:
PROJECT GENERATOR PROJECT NAME : p1 PROJECT DIRECTORY : C:\WorkSpace\p1\p1 SELECT TARGET : H8 Timy/SLP E8 SYSTEM 300H DATE & TIME : 8/27/2007 12:02:24 PM
×
<u><</u>
Click OK to generate the project or Cancel to abort.
☑ Generate Readme.txt as a summary file in the project directory
OK Cancel



(6) The [Emulator Setting] dialog box opens. Select the target device from [Device]. For [Mode], select [Program Flash]. Then,make settings for [Power supply] that fit your system and click on the [OK] button.

Emulator Setting	×
Emulator mode	
Device H8/3664F	
Mode C Erase Flash and Connect C Keep Flash and Connect Program Flash	
Power Supply Power Target from E8. (MAX 300mA) © 3.3 V © 5.0 V	
OK Cancel	

If the [Emulator Setting] dialog box does not appear, select [Connect] from the [Debug] menu.

If you intend to program flash memory in mass-produced microcomputers, do not use the function to supply power from the E8 to the user system.

(7) The [System Clock] dialog box opens. Enter the value that agrees with the actual operating frequency of your system.

Connecting	
System Clock ?X	
Please input System Clock	
MHz MHz	<u>^</u>
OK Cancel	
	9



(8) On completion of the connection, the entire on-chip flash memory is in the erased state.



(9) Select [Debug settings] from the [Debug] menu.

🖗 p1 - High-perform	ance Embedded W	orkshop						
File Edit View Project	Debug Setup Tool	s Test Window	Help					
10 🕅 16 10 8	Debug Sessions		🗈 ዓ ዓ ዓ 💷	Po Po Ri 💭	1/0 😝 🖉	3		
	Debug Settings							
⊡@ <mark>p1</mark> ⊡@ p1	∃¶ Reset CPU							
Download	, ≣↓ ⊆o	F5						
	≣↓ R <u>e</u> set Go	Shift+F5						
	国 Go To <u>C</u> ursor							
	I _{PC} Set <u>P</u> C To Cursor							
	<u>R</u> un							
	[№] PC Display PC	Ctrl+Shift+Y						
	{ +} Step <u>I</u> n	F11						
	3 Step Over	F10						
	{ € Step Out	Shift+F11						
	<u>S</u> tep							
	Step <u>M</u> ode	•						
	💷 <u>H</u> alt Program							
<u>_</u> . <u>.</u> <u>.</u>	Initialize							
	🖉 Connect							
· · · · · · · · · · · · · · · · · · ·	Pisconnec <u>t</u>							
Connected	Save Memory							
	Verify Memory							
			-					
Build Debu		s P	rsion Control /					
Edit debug settings	Unload Modules	•		Default1 desktop			INS	



(10) The [Debug Settings] dialog box appears. Click on the [Add] button.

Debug Settings				? 🔀
SessionH8_Tiny_SLP_E8_SYSTEM_300	Target Options			
	Target: H8 Tiny/SLP E8 SYST Default debug format: <none> Download modules: Filename</none>	EM 300H	▼ Format	Add Modify Remove Up Down
			ОК	Cancel

(11)The [Download Modules] dialog box opens. Select the file format from [Format] and click on the [Browse] button to select a file you wish to download (i.e., to be written to flash memory).

Download Module
Offset: 00000000 💽 🗾 OK
Forma S-Record Cancel
Filename: C:\WorkSpace\p1\p1\Debug_H8_Tiny Filename:
Access size: 1
Download debug information only
F Perform memory verify during download
Download automatically on target connection

(12) Check the settings in the [Debug Settings] dialog box and click on the [OK] button.

Debug Settings				? 🗙
SessionH8_Tiny_SLP_E8_SYSTEM_300	Target Options Target: H8 Tiny/SLP E8 SYSTER Default debug format:			
	S-Record Download modules: Filename C:\WorkSpace\p1\p1	Offset Address 00000000	Format S-Record	Add Modify Remove Up Down
			ОК	Cancel



(13)The [Download modules] list box shows the file you have selected.

🖗 p1 - High-performance Embedded Workshop
File Edit View Project Debug Setup Tools Test Window Help
] D 📽 🖬 🕼 👗 🕸 🖻 🕑]] 🙀 📃 💌 🛃 👤 🛃 🗐 🕸 🖽 🕹 Debug_ H8_
」 ⊕ 📧 🕒 8 2 🛒 🚝 📾 🙌 🛛 जी 11 🗊 11 🖓 19 19 🐨 फ, 🐜 🗍 🖼 💭 🕼
Image: Second encies Image: Second encies
A OI OT AL AT 21 21 2 IB 🖬 ?
Connected
Build Debug (Find in Files Macro Test Version Control /
🔣 🔝 🔣 Default1 desktop

No data have yet been written to the flash memory.

(14)Select the file and right-click to open a popup menu. Select [Download] to start downloading.





(15)Upon completion of downloading, a message box containing the text "Sum data" and "Flash memory writing OK." appears. Read the messages and click on the [OK] button.



A message box to inform that the programming has completed appears. Click on the [OK] button.



(16)Programming of the flash memory is now complete.



After programming has been completed, exit the E8 emulator software.

(17)The next time you start up the HEW, open the workspace you have created in this section.



The subsequent procedures are the same as those given in section 4.6 (6) and later. The HEW can also be started up by double-clicking on a HEW workspace file (with extension ".hws") in

the Windows Explorer, etc.



(18)If you wish to select one from multiple workspace files, add these files to the [Debug Settings] dialog box beforehand.



This allows the user to select a desired file in the [Workspace] pane.

Note, however, that only one file is selectable for downloading. It is not possible to download two or more files at the same time.

🖗 p1 - High-performance Embedded Workshop									
File Edit View Project Debug Setup Tools Test Window Help									
▋D 🛎 🖩 🖉 🛃 🗼 🖻 🖻 🕂 🐘 💽 🐂 💽 🛤 🛣 🖗 🖾 🗮 🛣 🕞	bug_H8_Tir								
] ⊕ 177 16 12 8 2									
Image: Second state of the second s									
Ă OL OT AL AT \$1 \$1 { 0 la ₩ ?									
Connected									
JJ ✓ ► N Build A Debug A Find in Files A Macro A Test A Version Control /									
📴 🔢 📰 El Default1 desktop									



(19) If you wish to change the target board of the user system, select [Initialize] from the [Debug] menu.

Ģ) p1	- Hij	gh-p	erform	ance	Em	ibedda	ed Wo	rks ho	р															×
Fi	le E	dit	View	Project	Deb	ug	Setup	Tools	Test	Window	Help)													
	Dı	1		7 8		Deb	ug Sess	ions						•	₩ţ	ñ	8		1		14 X	D	ebug	_H8	Tin
]	1	y	<u>16</u>	<u>10</u> 8		<u>D</u> eb	ug Setti	ngs			Ð	{ }}	0 +	{} •	STO	\mathbf{I}_{PC}	PC]][R1	Ģ	1/0			F	
					ĒŤ	Res	et CP <u>U</u>					_	_	_	_	_	_		_	_	_	_	_	_	r I.
	=	p1			≣↓	<u>G</u> o				F5															LI.
		- 491 -	-	Download	Ð	Res	et Go		Shi	ft+F5															LI.
				🗋 неті	Ež		Fo <u>C</u> urso	or																	LI.
			i	Depende	1.000	Set	<u>P</u> C To C	ursor																	U.
			_	Depende		<u>R</u> un																			LI.
					PC	Disp	ila <u>y</u> PC		Ctrl+Si	hift+Y															U.
					{ }	Step	o <u>I</u> n			F11															LI.
					0 •	Step	o O⊻er			F10															LI.
					{} •	Step	o <u>O</u> ut		Shift	t+F11															LI.
						<u>S</u> tep	o																		LI.
						Step	o <u>M</u> ode			•															U.
<u>-</u>	3	Pro	[E Te	50 0	<u>H</u> alt	Progra	n																	
× ,	ام ا	10	AT	A1 0		Initi	ali <u>z</u> e																		
<u>►</u>	·				3	Con																			_
	Coi	nneo	cted	1		Disc	onnec <u>t</u>																		
						S <u>a</u> v	e Merno	ry																	
						Veri	fy Memo	ory																	
						Dow	nload M	Iodules		•	1														
				_		_	ad Mod			•															
		₽V	Build) Debu					10 A	1056 // 1	ersion	n Con	trol	1											
Ini	tialize	e debu	ug pla	tform					1	2 3 4	De	fault	1 des	ktop											1

Change the board after "Disconnected" is shown on the [Debug] tabbed page of the [Output] pane.



6. Frequently Asked Questions

6.1 Can you provide any notes on checking the operation of the microcomputer operating independently of the emulator after debugging has been completed?

The notes given below are based on the assumption that the microcomputer is an H8 and that the specifications of the E8 emulator have led to a problem arising in independent operation. If you have selected [Program Flash], the E8 is capable of programming the whole ROM area as a normal ROM programmer. When checking operation independent of the E8, check the following points.

(1) Settings of the RES and NMI pins when the E8 is disconnected

Examples have been found where the RES or NMI pin had been fixed low when the E8 was disconnected, and this led to incorrect operation of the microcomputer (for example, if a pull-up resistor is not connected to the NMI pin on the board, disconnecting the E8 will also make the pin not connected).

(2) Checksum affected by areas occupied by the E8

As stated in the separate manuals for the individual devices, certain ROM areas are occupied by the E8. If the initialization section of a user program is calculating the checksum of data in all ROM areas, the checksum value will differ according to whether [Erase Flash and Connect] or [Program Flash] has been selected, because the contents of some regions of memory will be different. If you intend to calculate the checksum of data in ROM, take this point into account when creating your program.

(3) WDT setting

According to its specification, the E8 emulator may turn the WDT off during debugging.

The WDT may thus become active in independent operation of the actual device, even though the WDT wasn't active during debugging.

Firstly, refer to the hardware manual of the device you are using to check whether the WDT is initially on or off. If you have selected [Erase Flash and Connect], it is only possible to check the independent operation of the actual device after the E8 has been disconnected because the E8 performs debugging while programming the on-chip flash ROM. However, if PC breakpoints that have been set remain, a break instruction written to the ROM may lead to incorrect operation. For this reason, select [Keep Flash and Connect] where possible. If you wish to select [Erase Flash and Connect] for some reason, remove all breakpoints and ensure that the ROM has been correctly programmed before disconnecting the E8.

(4) Initialization of the stack pointer in the user program

In debugging with the E8 emulator, the debugger may initialize the stack pointer. Even if the device appears to be operating correctly during debugging, the operation of the actual device may be incorrect because the stack pointer has not been initialized beforehand. The stack pointer must be initialized in the user program.



7. Typical Error Messages and Resolutions

(1) Driver Error : Illegal driver inter face select

Communication with the E8 is not available. Disconnect the USB cable from the host computer and re-connect it.

(2) Driver Error: No available communication devices found.

The E8 is not connected. Check the state of the USB connector.

(3) Connector disconnected. Please, connect and press <Enter> key.

The user board and the E8 are not connected. Connect them and press the Enter key.

(4) Invalid value

An invalid value has been selected as the operating frequency. Check the oscillator on the user board.

(5) Flash memory erase error ! Change device

Erasing of the flash memory has failed. Change the device.

(6) Flash memory write error

Programming of the flash memory has failed.

This may be because the voltage on the user board is 3.0 V or lower while the E8 is operating in the programmer mode.

(7) Communication timeout error

The device does not respond.

Refer to the Frequently Asked Questions regarding the E8 on the Renesas website.



8. Related Documents

The E8 emulator and High-performance Embedded Workshop provide many other useful functions not mentioned in this document.

Please refer to the following related documents for important information such as detailed specifications, technical information, or restrictions.

Documents Related to the E8 Emulator:

- E8 Emulator User's Manual
- E8 Emulator Additional Document for Users Manual, Notes on Connecting the H8/3664F and others

Documents Related to High-performance Embedded Workshop:

- High-performance Embedded Workshop User's Manual
- High-performance Embedded Workshop Release Notes

Documents Related to CPU:

- H8/3664 Group Hardware Manual
- H8/300H Series Programming Manual

Documents Related to H8S, H8/300 Series C/C++ Compiler Package:

- H8S, H8/300 Series C/C++ Compiler, Assembler, Optimizing Linkage Editor User's Manual
- Notes on Usage of the C/C++ Compiler Package for H8S, H8/300 series

Information on this product is available at the following Renesas websites:

Global site:http://www.renesas.com/e8Japanese site:http://japan.renesas.com/e8



Renesas Website and Customer Support

Renesas Technology Website: <u>http://www.renesas.com/</u>

Customer Support:

http://www.renesas.com/inquiry csc@renesas.com

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