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User's Manual

ID850QB Ver. 3.40

Integrated Debugger

Operation

Target Device
V850 Microcontrollers

Document No. U18604EJ1V0UM00 (1st edition)
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PREFACE

Target Readers

This manual is intended for user engineers who design and develop application systems of the V850 microcontrollers.

Purpose

This manual is intended for users to understand the functions of the ID850QB in the organization below.

Organization

This manual consists of the following chapters:

- OVERVIEW
- INSTALLATION
- STARTING AND TERMINATING
- ASSOCIATION WITH PM+
- DEBUG FUNCTION
- WINDOW REFERENCE
- COMMAND REFERENCE

How to Use This Manual

It is assumed that the readers of this manual have general knowledge of electrical engineering, logic circuits, microcontrollers, C language, and assemblers.

To understand the functions of the V850 microcontrollers

→ Refer to Hardware User's Manual for each product.

To understand the instruction functions of the V850 microcontrollers

→ Refer to **V850ES Architecture User's Manual (U15943E)** or **V850E1 Architecture User's Manual (U14559E)**.

Conventions

Data significance:	Higher digits on the left and lower digits on the right
Note:	Footnote for item marked with **Note** in the text
Caution:	Information requiring particular attention
Remark:	Supplementary information
Numerical representation:	Binary … XXXX or XXXXB
	Decimal ... XXXX
	Hexadecimal … 0xXXXX

Prefix indicating the power of 2 (address space, memory capacity):

K (Kilo): $2^{10} = 1024$

M (Mega): $2^{20} = 1024^2$

Related Documents Refer to the documents listed below when using this manual.
The related documents indicated in this publication may include preliminary versions.
However, preliminary versions are not marked as such.

Documents related to development tools (User's Manuals)

Document Name		Document No.
IE-V850E1-CD-NW(PCMCIA Card Type On-Chip Debug Emulator)		U16647E
QB-V850ESSX2(In-circuit emulator for V850ES/SG2, V850ES/SJ2)		U17091E
QB-V850IA4(In-circuit emulator for V850ES/IK1, V850E/IA3, V850E/IA4)		U17167E
QB-V850ESKX1(In-circuit emulator for V850ES/Kx1, V850ES/Kx1+)		U17214E
CA850 Ver. 2.70 C Compiler Package	Operation	U16932E
	C Language	U16930E
	Assembly Language	U16931E
	Link Directives	U16933E
CA850 Ver. 3.00 C Compiler Package	Operation	U17293E
	C Language	U17291E
	Assembly Language	U17292E
	Link Directives	U17294E
PM+ Ver.6.00 Project Manager		U17178E
ID850QB Ver. 3.40 Integrated Debugger	Operation	This manual
SM+ System Simulator	Operation	U18010E
	User Open Interface	U17663E
SM850 Ver. 2.50 System Simulator	Operation	U16218E
SM850 Ver. 2.00 or Later System Simulator	External Part User Open Interface Specifications	U14873E
RX850 Ver. 3.20 Real-Time OS	Basics	U13430E
	Installation	U17419E
	Technical	U13431E
	Task Debugger	U17420E
RX850 Pro Ver. 3.20 Real-Time OS	Fundamental	U13773E
	Installation	U17421E
	Technical	U13772E
	Task Debugger	U17422E
AZ850 Ver. 3.30 System Performance Analyzer		U17423E
PG-FP4 Flash Memory Programmer		U15260E
TW850 Ver.2.00 Performance Analysis Tuning Tool		U17241E

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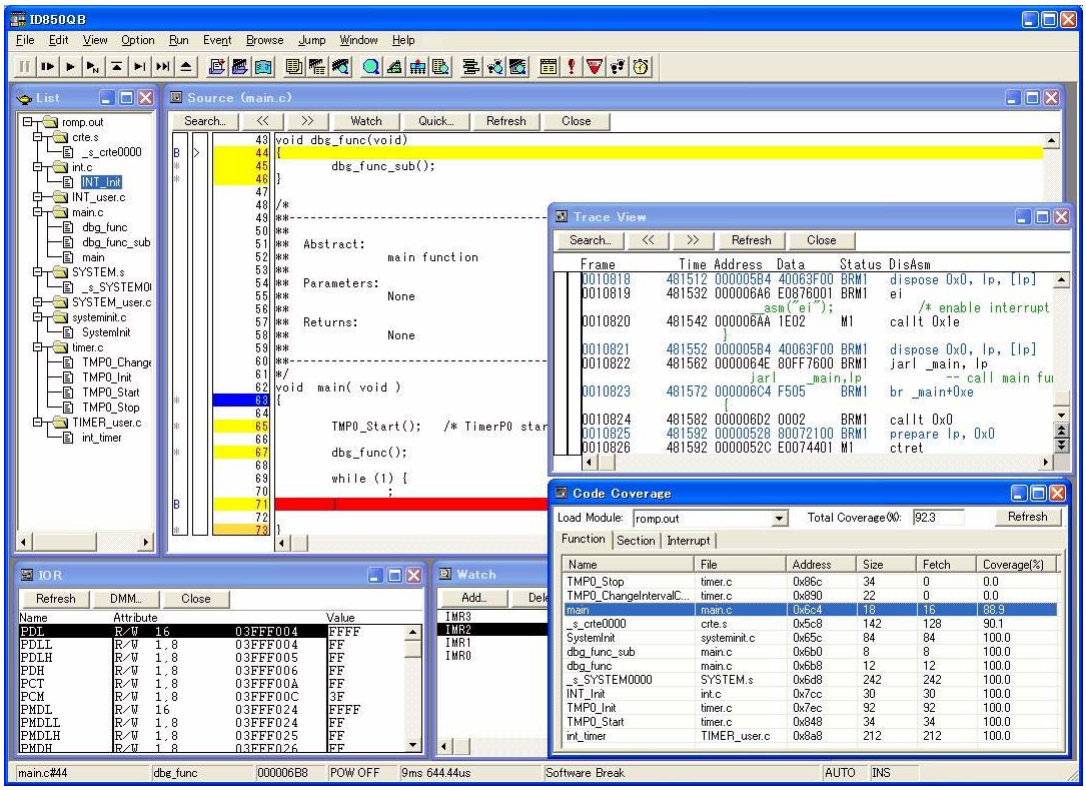
CHAPTER 1 OVERVIEW

The Integrated Debugger ID850QB for the V850 microcontrollers (hereafter referred to as the ID850QB) is a software tool developed for NEC Electronics V850 microcontrollers for embedded control. This software tool is intended to enable efficient debugging of user programs.

The functions that can be implemented with the ID850QB vary depending on the emulator connected. (descriptions in parentheses show the symbols used to indicate each device in this manual).

- When the IECUBE™ is connected (**[IECUBE]**)
- When the N-Wire CARD or MINICUBE™ is connected (**[MINICUBE]**)
- When the MINICUBE2 is connected (**[MINICUBE2]**)

Figure 1-1 ID850QB



This chapter explains the following items regarding the ID850QB.

- Features
- System Configuration
- Operating Environment
- Cautions During Debugging
- Notes on Using GHS Compiler

1.1 Features

The ID850QB has the following features:

- New functions, enhanced functions
- Other functions

1.1.1 New functions, enhanced functions

(1) Support of Midas Lab emulator

Midas Lab emulator RTE-2000H-TP is now supported (refer to "3.2 Cautions on connecting Midas Lab emulator").

(2) Support of flash self programming for MF2 devices [IECUBE]

Flash self programming for MF2 devices is now supported (refer to " Flash Option Dialog Box").

(3) Support of VSB ROM and VSB RAM of V850/Dx3 [IECUBE] [MINICUBE]

VSB ROM and VSB RAM of the V850/Dx3 are now supported (refer to " Configuration Dialog Box" and " Download Dialog Box").

(4) Support of high-speed download [IECUBE]

High-speed downloading is now supported. The target areas are internal ROM and internal RAM (including VSB ROM and VSB RAM) (refer to " Download Dialog Box").

(5) Support of E2 core devices

E2 core devices are now supported (refer to " Download Dialog Box").

(6) Support of Motorola S type 16-bit record

Motorola Hex format S type 16-bit record files (S1 and S9) can now be downloaded.

(7) Downloading to external flash memory

Load module files and Hex format files can now be downloaded to a flash memory connected to an external bus (refer to "5.2.2 Downloading to External Flash Memory").

(8) Selection of coverage colors

Colors used to distinguish the coverage of a user program code can now be selected (refer to " Coverage-Color Dialog Box").

(9) Automatic source path setting

Source files stored in the folder where they were placed during building are automatically displayed (refer to " Source Text Move Dialog Box").

1.1.2 Other functions

(1) Using function of in-circuit emulator

By using the event setting function of an in-circuit emulator, break events can be set, the user program can be traced, and time can be measured, and so on. (Refer to "5.12 Event Function".)

(2) Support of on-chip debugging [MINICUBE]

A debugging function implemented by the on-chip debug unit of the Nx85ET（RCU0+TEU+TRCU）, Nx85E901（RCU0）, RCU1 is provided.

(3) Flash memory writing function [MINICUBE] [MINICUBE2]

The internal flash memory can be written and the load module can be downloaded by the same access method as an ordinary memory operation. (Refer to "5.7.4 Flash memory writing function [MINICUBE] [MINICUBE2]".)

(4) Security function [MINICUBE] [MINICUBE2]

The ID code stored in the internal ROM or internal flash memory of a product with a security unit can be authenticated. (Refer to "(5) ID Code [MINICUBE] [MINICUBE2]" in the " Configuration Dialog Box".)

(5) Function expansion through Tcl

The batch processing and hook processing, and the creation of original user custom windows are possible using the command line with Tcl/Tk (Tool Command Language). (Refer to "CHAPTER 7 COMMAND REFERENCE", "APPENDIX A EXPANSION WINDOW".)

The latest Tcl/Tk core 8.4.12 and new console are supported.

(6) Function expansion through TIP or ToolLink

By associating with a task debugger (RD) and system performance analyzer (AZ) supporting TIP (Tool Interface Protocol) or ToolLink, the debugging efficiency of the user program using a real-time OS (RX) can be dramatically improved.

1.2 System Configuration

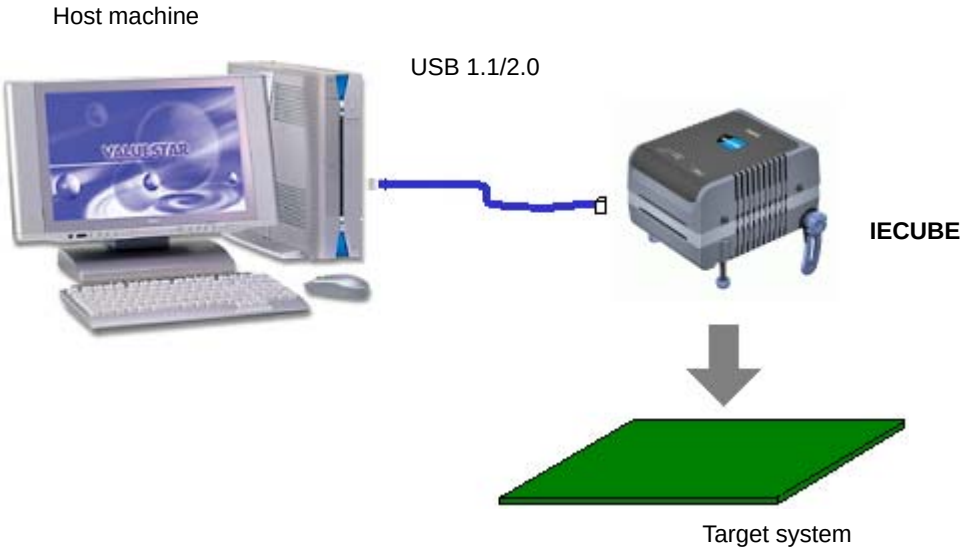
The ID850QB can be connected to the following three types of emulators.

User programs developed for the V850 microcontrollers and a pleasant debugging environment for target systems are provided.

(1) IECUBE

IECUBE can be manipulated from the ID850QB by connected it to the ID850QB via a USB cable.

Figure 1-2 Example of ID850QB System Configuration (IECUBE)

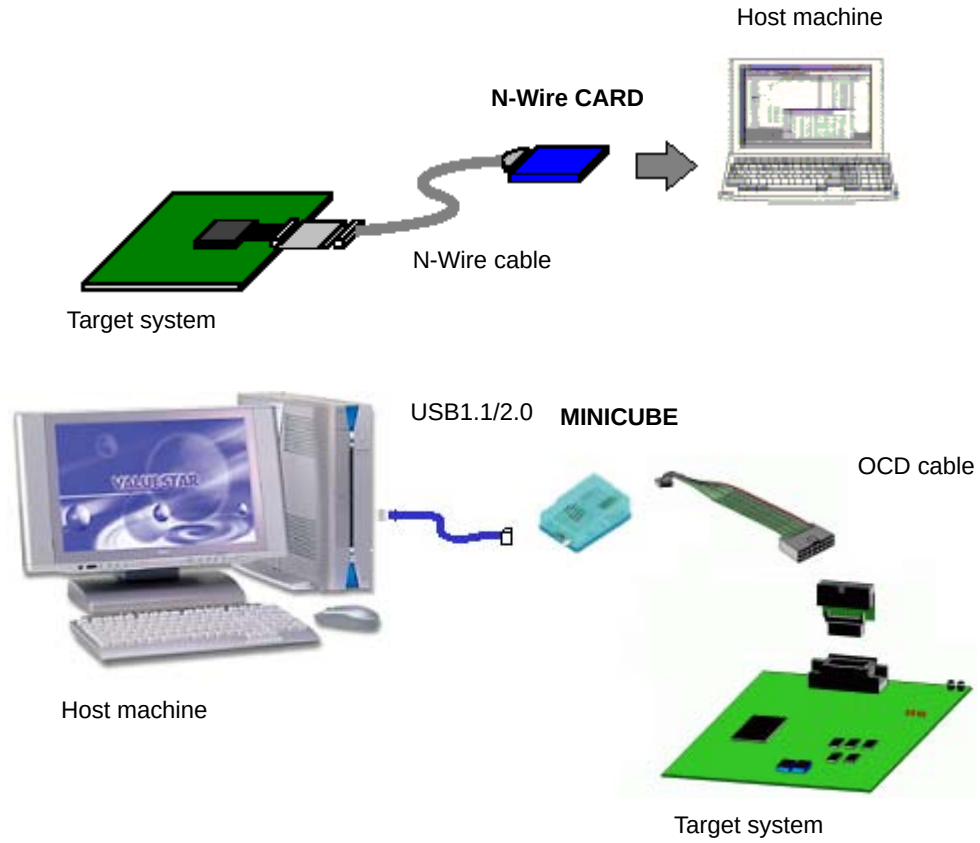


(2) N-Wire CARD, MINICUBE

The N-Wire CARD, MINICUBE can provide debugging functions by connecting it to a target system on which the V850ES incorporating an RCU (Run Control Unit) and the V850E1 are mounted.

The N-Wire CARD a PC card emulator, can be manipulated from the ID850QB by directly inserting it to the host machine. The MINICUBE can be manipulated from the ID850QB via a USB cable.

Figure 1-3 Example of ID850QB System Configuration (N-Wire CARD, MINICUBE)



(3) MINICUBE2

MINICUBE2 is operated via the ID850QB when it is connected to the host machine with the USB cable.

MINICUBE2 can provide the debug function when it is connected to a microcontroller with the on-chip debug function.

Figure 1-4 Example of ID850QB System Configuration **[MINICUBE2]**

1.3 Operating Environment

This section explains the following items regarding the operating environment.

- Hardware environment
- Software environment

1.3.1 Hardware environment

(1) Host machine (The machine by which the target OS operates)

CPU	Pentium® II 400 MHz or above
Main memory	256 MB or above

Caution: When N-Wire CARD is connected, because it is assumed that the IECUBE is used with a notebook PC, the host machine must have a PC card slot (TYPEII).

(2) In-circuit emulator

- IECUBE (QB-V850Exxxx)
- N-Wire CARD (IE-V850E1-CD-NW)
- MINICUBE (QB-V850MINI)
- MINICUBE2 (QB-MINI2)
- RTE-2000H-TP(PG2-IE)

1.3.2 Software environment

(1) OS (any of the following)

Windows® 2000, Windows XP(Home Edition, Professional)

Caution: Regardless of which of the OS above is used, we recommend that the latest Service Pack is installed.

(2) Device file (Individual acquisition)

- The device file of the target device to be used.

Remark: This file is available from the following Web site of NEC Electronics (Version-up Service).
http://www.necel.com/micro/ods/eng/

(3) Supported tools (manufactured by NEC Electronics)

- C compiler package CA850 (Version 3.10 or later)
- Project manager PM+ (Version 6.10 or later)
- System performance analyzer AZ850 (Version 3.30 or later)
- Performance tuning tool TW850 (Version 2.10 or later)

1.4 Cautions During Debugging

The cautions to be observed during debugging are described below.

- When performing source level debugging
- Security ID [MINICUBE] [MINICUBE2]

1.4.1 When performing source level debugging

The object file for which source level debugging is performed must include symbol information or other information for debugging (debugging information).

Therefore, perform the following processing during source file compiling.

(1) When using the PM+

Specify [Debug Build] when the Build mode is selected.

(2) When not using the PM+

Add the -g option.

1.4.2 Security ID [MINICUBE] [MINICUBE2]

The object file used when N-Wire CARD, MINICUBE, MINICUBE2 is connected must include the security ID (ID code) information.

For the security ID settings, refer to "CA850 Operation".

For details about the security ID, refer to the N-Wire CARD, MINICUBE, MINICUBE2 user's manual.

The security ID from the ID850QB is set in the Configuration Dialog Box.

1.5 Notes on Using GHS Compiler

ID850QB V3.20 and later support Green Hills Software compiler that is compatible with the GHS Extended DWARF2 format.

1.5.1 Supported version

The following versions of the GHS compiler are supported.

- Integrated development environment MULTI TM(V3.5.1, V4.0.5) (DWARF2 format)

Caution: C++ is not supported. In addition, the V850E2R cores are not supported.

1.5.2 Option added for debugging (debug option)

The following option (debug option) should be added for debugging with the GHS compiler.

- -G -dual_debug

1.5.3 Cautions on Using DWARF2 Load Module

Note the following points when using a DWARF2-format load module file.

(1) GNU C expanded specifications are not yet supported.
(2) The profiling function is not yet supported.
(3) PM+ and TW850 cannot be used by linking to each other.
(4) The Stack Window is not yet supported.
(5) Execution cannot be stepped into functions defined in an include file.
(6) No breakpoints can be set to functions defined in an include file.
(7) In the function name list, the names of functions defined in an include file are displayed with the name used by the side that references the include file.
(8) The FPU (floating-point operation unit) is not yet supported.
(9) In the variable name list, global variable names are displayed at the defined locations and referencing locations (extern locations). (This item depends on the GHS compiler specifications.)
(10) The watched variable value may be displayed incorrectly or the value may not be changed, because debug information does not include valid period information of variables. (This item applies to cases where a variable is optimized and deleted, or a value is temporarily assigned to a register).
(11) Floating point rounding accuracy differs between the compiler and debugger.
(12) Debugging of assembler sources is not possible.
(13) Step execution of *include* statement is not possible.
(14) Step execution of *setjmp()* and *longjmp()* is not possible.

CHAPTER 2 INSTALLATION

This chapter explains the following items about installation of ID850QB:

- Installing
- Uninstalling

2.1 Installing

The following items must be installed, when the ID850QB is used.

Table 2-1 Install

Item	Procedure
ID850QB	**When using the installer on the ID850QB Disk:** Install the contents of this disk according to the automatically executed installer. **When using the installer downloaded from Version-up Service webpage:** Run the downloaded executable file following the guidance of installer.
Device file	Install this file according to the DFINST.exe dedicated startup installer by selecting [start] menu -> [All Programs] -> [NEC Electronics Tools] -> [DeviceFile Installer].

2.2 Uninstalling

Perform uninstallation using [Add/Remove Programs] on the Control Panel.

CHAPTER 3 STARTING AND TERMINATING

This chapter explains the following items related to the starting and terminating the ID850QB:

- Cautions Before Starting [MINICUBE] [MINICUBE2]
- Cautions on connecting Midas Lab emulator
- Startup Option and Argument Specification
- Starting
- Terminating
- Error Messages at Start Up

3.1 Cautions Before Starting [MINICUBE] [MINICUBE2]

When the N-Wire CARD, MINICUBE or MINICUBE2 is connected, start the following check tools before the starting the ID850QB to check that the emulator and the target system can be normally debugged.

- N-Wire Checker **[MINICUBE]**
- OCD Checker **[MINICUBE2]**

Caution: For the connection between the emulator and the target system and the power application sequence, refer to the N-Wire CARD, MINICUBE or MINICUBE2 User's Manual.
Incorrect connection may damage the emulator and the target system.

3.2 Cautions on connecting Midas Lab emulator

When Midas Lab emulator RTE-2000H-TP is connected, be sure to perform the following settings before starting the ID850QB.

Set the type of the CPU that is controlled by Midas Lab rte4win32, using "Check RTE2".

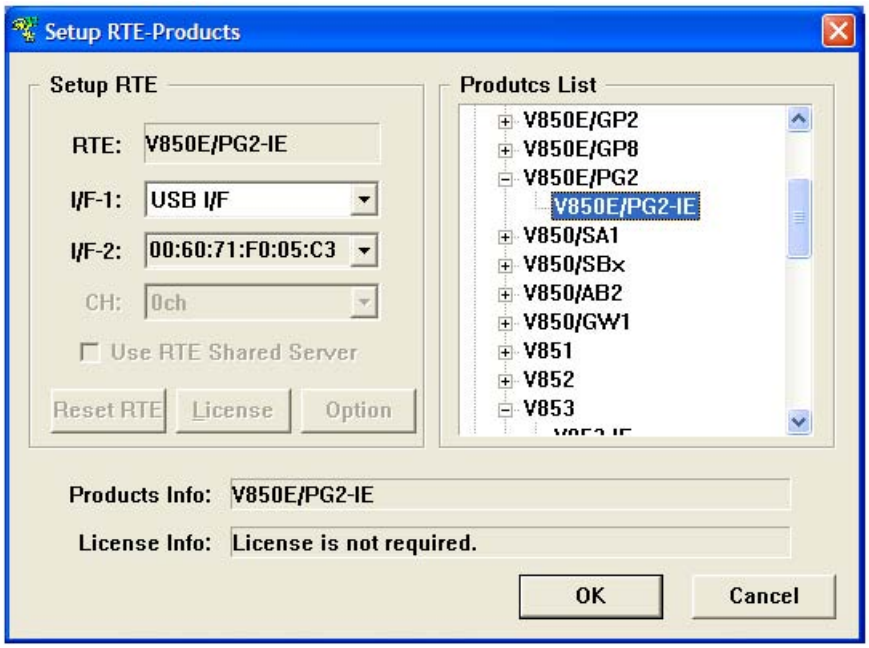
For details, refer to documents related to rte4win32 and KIT.

Remark: URL of Midas Lab Inc. download site

http://www.midas.co.jp/download/english/program.htm

1) Select an in-circuit emulator such as PG2-IE in the "Products List" field (select the CPU name in the case of OCD).
2) Select a USB port or LAN from "I/F-1:" in the "Setup RTE" field.
3) Click the <License> button to input the license code. In the case of OCD, also click the <Option> button to input the ID code.

Figure 3-1 Check RTE2



Remark: When using a Midas Lab emulator, the dedicated startup option must be specified (refer to "3.3.2 Specification format and options").

3.3 Startup Option and Argument Specification

The procedure for specifying the startup options and arguments for the ID850QB is described below.

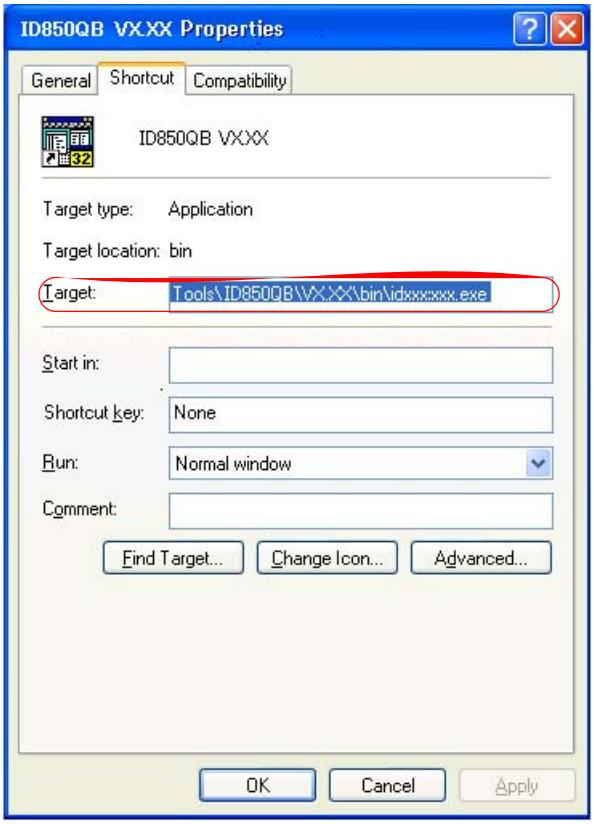
By specifying the startup options and arguments, it is possible to specify the script file at startup and the project file.

Remark: When starting up the ID850QB from PM+, the startup option and argument settings are performed in [Debugger Settings...] in the [Tool] menu of PM+. (Refer to "CHAPTER 4 ASSOCIATION WITH PM+".) The debugger startup option can be set to the option column.

3.3.1 Specification method

1) Create the ID850QB shortcut on the desktop.
   The ID850QB execution file is located in the bin folder in the folder to which the installation was performed.
2) Open the properties of the created shortcut and after the execution file name displayed in [Target:], specify the option and argument. (Refer to "3.3.2 Specification format and options".)

Figure 3-2 Startup Option (Example)



3.3.2 Specification format and options

(1) Specification format

```
xxxxx.exe ?options?
xxxxx.exe ?options? project
```

Each option and argument is separated by a space. The case is distinguished in the character string.

Arguments enclosed between '?' can be omitted.

When a project file is specified, that project file is read at startup.

However, during PM+ startup, the project file specification is ignored.

When there are spaces in the file names and paths, specify the project file names and script file names enclosed in double quotation marks (" "). (Refer to " Example3) Specification when there are spaces in the path".)

Remark: The emulator currently being connected is automatically detected by the automatic emulator detect function when a debugger execution program is started. The user therefore does not need to select the debugger execution program according to the emulator to be connected. (When using a Midas Lab emulator, specify it using the startup option ("Table 3-1 Startup Options".)

(2) Specification options

The following options can be specified.

Table 3-1 Startup Options

Options	Meaning
/sc	Change background color of window to system color.
/script:*script file name*	Specify the script file to be executed at startup.
/ICE:RTE /EXEC:EX850G32RTE	Specify N-EXEC for Midas Lab.

(3) Specification example

Example1) Specification of script file only

```
xxxxx.exe /script:c:\work\script.tcl
```

Example2) Specification of script file and project file

```
xxxxx.exe /script:c:\work\script.tcl c:\work\project.prj
```

Example3) Specification when there are spaces in the path

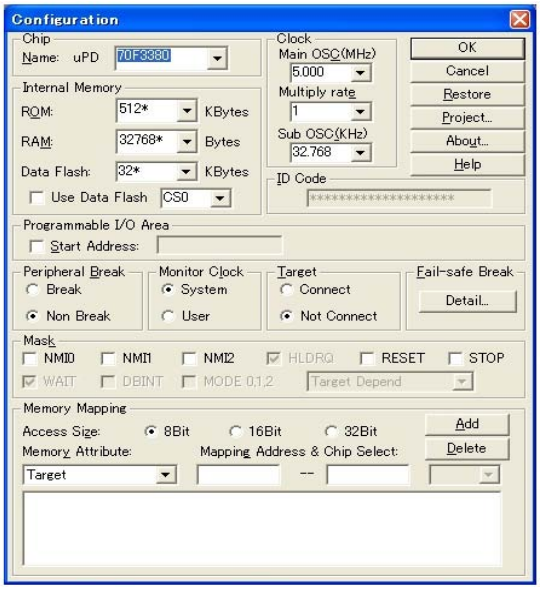
```
xxxxx.exe /script:"c:\work folder\script.tcl" "c:\work folder\project.prj"
```

3.4 Starting

1) Start ID850QB from the [Start] menu of PM+ or by clicking the shortcut created on the desktop.
   Refer to "4.3 To Start ID850QB from PM+" when starting from PM+.
   Start the ID850QB, the Configuration Dialog Box will be opened.

Caution: In this case, the Configuration Dialog Box should not be displayed, but an error message should be displayed, please cope with it with reference to "3.6 Error Messages at Start Up".

Figure 3-3 Configuration Dialog Box

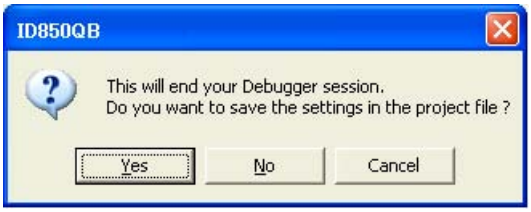


2) Set the items related to the operating environment of the ID850QB in the Configuration Dialog Box. After setting each item, click the <OK> button in the dialog box.
3) The Main Window will be opened and the ID850QB can be operated. Mainly use this window for debugging.

3.5 Terminating

1) Select [File] menu -> [Exit] on the Main Window. The following the Exit Debugger Dialog Box will be opened: (An execution stop confirmation message is displayed when stop operation is performed during program execution.)

Figure 3-4 Exit Debugger Dialog Box



2) To save the current debugging environment to a project file, click the <Yes> button. If the <No> button is clicked, all the windows are closed the ID850QB terminated.

3.6 Error Messages at Start Up

Error messages that may be output when ID850QB starts up are listed below (by order of occurrence).

When these messages are output, refer to "APPENDIX E MESSAGES".

Caution: When multiple emulators are connected, the emulator priority order is as follows.

IECUBE > MINICUBE > MINICUBE2 > N-Wire CARD

3.6.1 When the IECUBE is connected

The pattern of the output error message differs as follows depending on the connection status with the target and the settings in the Configuration Dialog Box.

Table 3-2 Error Message Output Pattern **[IECUBE]**

Error Message	[Target] Area in the Configuration Dialog Box		Target		Exchange Adapter		Target Power Supply	
	Connect	Not Connect	Connect	Not Connect	Used	Not Used	ON	OFF
Ff606: Please check connection with the target board, and power on it.	Selected							Selected
Wf607: Please check connection of the exchange adapter.		Selected		Selected		Selected		Selected
Ff608: Please disconnect the target board.		Selected	Selected					Selected
Ff609: Please power off the target board, and disconnect it.		Selected					Selected	

F0100: Can not communicate with ICE. Please confirm the installation of the device driver for the PC interface board.
F0c43: Connection of emulator cannot be performed.
F0c70: DCU cannot be accessed.
F0c76: Initial state at the time of DCU access start is unusual.

F0c77: DCU access is unusuall.
Ff606: Please check connection with the target board, and power on it.
Wf607: Please check connection of the exchange adapter.
Ff608: Please disconnect the target board.
A0105: Failed in reading device file (file name).
F0ca2: This device file does not include the on-chip debug information.
F0ca4: This device file does not include the IECUBE information.
F0c71: Reset cannot be performed.
F0c72: Monitor memory cannot be accessed.
F0c73: Monitor execution cannot be performed.
F0c74: CPU register cannot be accessed.
F0c23: Bus hold under continuation.
A0c01: During access of register, CPU did time out.
A0c02: During access of memory, CPU did time out.
F0c04: External flash memory database file was not found.
A01a0: No response from the evachip. Please confirm the signal of the CLOCK or RESET WAIT, HLDRQ and so on. No response from the CPU. Please confirm the signal of the CLOCK or RESET WAIT, HLDRQ and so on.

3.6.2 When the N-Wire CARD or MINICUBE is connected

F0100: Can not communicate with ICE. Please confirm the installation of the device driver for the PC interface board.
F0c43: Connection of emulator cannot be performed.
F03a0: Target is not turned on.
F0c70: DCU cannot be accessed.
F0c76: Initial state at the time of DCU access start is unusual.
F0c77: DCU access is unusuall.
A0105: Failed in reading device file (file name).
F0ca2: This device file does not include the on-chip debug information.
F0ca3: Unsupported information is included in the on-chip debug information in the device file.
F0c24: It cannot shift to debug mode.
F0c72: Monitor memory cannot be accessed.
F0c73: Monitor execution cannot be performed.
F0c74: CPU register cannot be accessed.
F0c23: Bus hold under continuation.
A0c01: During access of register, CPU did time out.

A0c02: During access of memory, CPU did time out.
F0c04: External flash memory database file was not found.
A01a0: No response from the evachip. Please confirm the signal of the CLOCK or RESET WAIT, HLDRQ and so on. No response from the CPU. Please confirm the signal of the CLOCK or RESET WAIT, HLDRQ and so on.

3.6.3 When the MINICUBE2 is connected

F0100: Can not communicate with ICE. Please confirm the installation of the device driver for the PC interface board.
F0c43: Connection of emulator cannot be performed.
A01b2: The firmware of the emulator is old version. Please update it with utility to the latest firmware.
A0105: Failed in reading device file (file name).
F03a0: Target is not turned on.
F0ca2: This device file does not include the on-chip debug information.
F0ca3: Unsupported information is included in the on-chip debug information in the device file.
F0ca1: Monitor file not found.
F0c00: Monitor file read error.
F0c71: Reset cannot be performed.
F02a3: Reset under continuation.
F0c72: Monitor memory cannot be accessed.
F0c24: It cannot shift to debug mode.
F0c74: CPU register cannot be accessed.
F0c73: Monitor execution cannot be performed.
F0c33 : Disabling the on-chip debug function is prohibited.
F0c34 : Writing to the on-chip debug reserved area is prohibited.
A010a: Cannot run debugger and a utility at the same time.
A01a6: Executor is running.

CHAPTER 4 ASSOCIATION WITH PM+

The ID850QB can automatically perform a series of operations in development processes, such as creating source files -> compiling -> debugging -> correcting source files, in association with the PM+.

This chapter explains the following items related to association with the PM+.

For details of the PM+ functions, refer to the PM+ User's Manual.

- Setting Build Mode
- Registering Debugger to PM+ Project
- To Start ID850QB from PM+
- Auto Load

Caution: If a load module file is created by using the Windows command prompt, the function to associate the ID850QB with the PM+ cannot be used.

4.1 Setting Build Mode

To debug the load module file created by the PM+ on the ID850QB at the source level, build to output symbol information for debugging must be performed to create a load module file. This setting can be performed by selecting [Debug Build] on the PM+.

4.2 Registering Debugger to PM+ Project

The debugger to be used or the load module files to be downloaded can be specified for each project in the PM+.

4.2.1 Selecting debugger

The procedure for selecting the debugger is as follows:

The ID850QB is registered as the debugger of the active project. The ID850QB icon is displayed on the toolbar of the PM+.

(1) Creating a new workspace

1) Select [File] menu -> [New Workspace...] on the PM+.
   -> This opens the dialog box to create a new workspace using the wizard format.
2) Creating the necessary settings for the workspace with the wizard, the [Select Debugger] dialog box will be opened. Specify ID850QB in this dialog box.
   For details of the setting, refer to the User's manual.

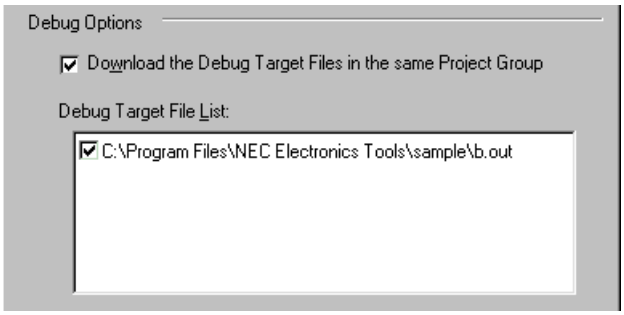
(2) Using an existing workspace

1) Select [Tool] menu -> [Debugger Settings...] on the PM+.
   -> The [Debugger Settings] dialog box will be opened.
2) Specify ID850QB and click the <OK> button in this dialog box. For details of the setting, refer to the User's manual.

4.2.2 Downloading multiple load module files

Load module files in the same project group can be downloaded when using the ID850QB.
Download multiple load module files by specifying items in the [Debugger Settings] dialog box of PM+.

Figure 4-1 Downloading Multiple Files



For details of the project group, refer to the "User's manual".

Remark: Multiple load module files that are being downloaded can be selected in the Load Module List Dialog Box of the ID850QB.

Caution: If [Execute symbol reset after download] in the [Debugger Settings] dialog box of the product with a internal flash memory is selected, the contents of the internal flash memory are erased before downloading.

4.3 To Start ID850QB from PM+

The ID850QB can be started from the PM+ as follows:

- Click the ID850QB starting button on the toolbar of the PM+.
- Select the [Build] menu -> [Debug] on the PM+.
- Select the [Build] menu -> [Build and Debug] on the PM+.
- Select the [Build] menu -> [Rebuild and Debug] on the PM+.

If the debugging environment of the ID850QB is saved to a project file currently being used by the PM+, it will be started in the debugging environment saved in the project file.

If the debugging environment of the ID850QB is not saved to a project file being used by the PM+, the Configuration Dialog Box is opened. At this time, the device type (chip name) cannot be changed.

Caution: With PM+, if too many source files are registered in a project, the number of files may exceed the upper limit of the source path length that can be registered to the ID850QB, the source files consequently may not be displayed automatically.
For details on the source path length, refer to "(1) Source Path" in the Debugger Option Dialog Box.

4.3.1 Restoring debugging environment

The previous debugging environment can be restored by the following procedure when the ID850QB is started from the PM+:

1) Create a new workspace (project file: e.g., sample.prj) on the PM+[Note].
2) Start the ID850QB from the PM+. Because a new project file is created, set items other than the device type (chip name) in the Configuration Dialog Box in the same manner as when only the ID850QB is started.
3) Download the load module file to be debugged with the Download Dialog Box of the ID850QB.
4) Debug the load module file on the ID850QB.
5) Click the <Yes> button on the Exit Debugger Dialog Box when the ID850QB is terminated.
   -> The debugging environment will be saved to the project file (sample.prj) for the PM+ when the ID850QB is terminated (the debug environment can also be saved to the sample.prj file by overwriting the project file at times other than the completion of ID850QB debugging).
6) When the ID850QB is next started up after the sample.prj file is read by PM+, the debug environment at the point when the project file was saved is automatically restored.

Note: In the ID850QB and PM+, the environment information is saved to a project file and referenced. The extension of the project file that can be used by the ID850QB and PM+ is "prj". For the information that is saved or restored by the project file, refer to the "User's manual" of each product.

4.4 Auto Load

If a bug is found while the load module file is being debugged by the ID850QB, correct the source file using the following procedure. Compiling and re-downloading the file can be automatically executed. (Refer to "4.4.1 Auto load by correcting source code".)

The load module is downloaded again to the ID850QB by compiling and linking the file on the PM+ with the activated ID850QB. (Refer to "4.4.2 Auto load by starting debugger".)

Caution: This processing cannot be performed if it is selected that the standard editor (idea-L) is used with the PM+.

4.4.1 Auto load by correcting source code

Correct the source file for auto load as follows:

1) Open the source file to be corrected in the Source Window. Select [File] menu -> [Open] and specify the file to be corrected on the ID850QB (if the file is already open in the Source Window, that window is displayed in the forefront).
   -> The specified file will be opened in the Source Window.
2) Select [Edit] menu -> [Edit Source] on the ID850QB.
   -> An editor will be opened and the specified source file will be read.
3) Correct the source file on the editor.
4) Terminate the editor.

Caution: The CPU reset is not performed when the load module file is automatically downloaded. The debug window that was opened when the editor was called, and each event setting will be restored. If the previously used line or symbol has been deleted as a result of correcting the source file, the following happens:
- A variable that was displayed is dimmed.
- The event mark of an event condition is displayed in yellow.
- A software break point may be deleted.

5) Select [Build] menu -> [Build and Debug], or [Build] menu -> [Rebuild and Debug] on the PM+.

4.4.2 Auto load by starting debugger

If the following operation is performed on the PM+ with the ID850QB started, the load module will be automatically downloaded to the ID850QB.

- Selecting the [Build] menu -> [Build and Debug] on the PM+.
- Selecting the [Build] menu -> [Rebuild and Debug] on the PM+.

Remark: Specify whether to use a CPU reset after downloading from [Debugger Settings...] on the [Tool] menu of PM+ (a CPU reset is performed by default).

CHAPTER 5 DEBUG FUNCTION

This chapter explains about debug function of ID850QB.

Table 5-1 Debug Function List (Flow of Debugging Operations)

Item	Refer To
To set the debugging environment	5.1 Setting Debugging Environment
To download the load module	5.2 Download Function, Upload Function
To display the source file and the disassemble result	5.3 Source Display, Disassemble Display Function
To set a break point	5.4 Break Function
To execute the user program	5.5 Program Execution Function
To check the variable value	5.6 Watch Function
To check and edit the memory contents	5.7 Memory Manipulation Function
To check and change the register variable	5.8 Register Manipulation Function
To check the execution time	5.9 Timer Function [IECUBE]
To check the trace data	5.10 Trace Function [IECUBE]
To check the code coverage measurement results	5.11 Coverage Measurement Function [IECUBE]
To manage the events	5.12 Event Function
RAM sampling	5.13 RRM Function
DMM function	5.14 DMM Function
To save the debug environment and window status	5.15 Load/Save Function
Jump function, linking window and cautions	5.16 Functions Common to Each Window

5.1 Setting Debugging Environment

This section explains the following items related to the setting debugging environment:

- Setting operating environment
- Setting option
- Setting mapping
- To change the value of a register required for access of an external memory

5.1.1 Setting operating environment

The in-circuit emulator operating environment settings are performed in the Configuration Dialog Box that is automatically displayed when the ID850QB starts up.

If a project file already exists, the debugging environment can be restored by clicking the <Project...> button. (Refer to "5.15.1 Debugging environment (project file)".)

5.1.2 Setting option

Perform setting related to the debugger or in-circuit emulator in the following setting dialog boxes.

- Configuration Dialog Box
- Extended Option Dialog Box
- Fail-safe Break Dialog Box
- RRM Setting Dialog Box
- Flash Option Dialog Box
- Data Flash Option Dialog Box
- Debugger Option Dialog Box

5.1.3 Setting mapping

The mapping settings are performed in the Configuration Dialog Box.

Table 5-2 Mapping Attribute

Attribute	Meaning
Emulation ROM **[IECUBE]** (With memory board)	Emulation ROM The memory area specified as the emulation ROM area is equivalent to the memory area when the target device is connected to ROM. The target device accesses the memory in the in-circuit emulator. If the target device attempts writing to this memory area, a write protect break occurs.
Emulation RAM **[IECUBE]** (With memory board)	Emulation RAM The memory area specified as the emulation RAM area is equivalent to the memory area when the target device is connected to RAM. The target device accesses the memory in the in-circuit emulator.
Target	User area mapping The memory area specified for user area mapping becomes the area to accesses the memory in the target system or memory incorporated in the CPU.
Target ROM **[IECUBE]**	Target ROM Areas specified as target ROM are subject to write protect for fail-safe break. (Refer to " Fail-safe Break Dialog Box".)
I/O Protect	I/O protect area An I/O Protect area can be set in the area specified for the "target". The I/O protect area is displayed in the same manner as an area that is not mapped (display symbol: ??), on the Memory Window. By mapping an area with this attribute, data cannot be read or written from/to this area by the Memory Window, on the area can therefore be protected from an illegal access.To read or write the value of the area mapped with this attribute, register the value in the IOR Window or Watch Window.

5.1.4 To change the value of a register required for access of an external memory

When mapping has been performed for external memory, must change the values of the registers required for accessing external memory prior to downloading, using the IOR Window or the hook procedure.

For how to change register values using the hook procedure, refer to "7.9 Hook Procedure".

For the registers to be changed, refer to the hardware manual of the CPU that is used.

5.2 Download Function, Upload Function

ID850QB allows downloading and uploading of object files in the formats listed in the following table: Table 5-3, Table 5-4.

This section explains the following items:

- Download
- Downloading to External Flash Memory
- Upload

5.2.1 Download

Object files are downloaded in the Download Dialog Box.

The corresponding source text file (Source Window) is displayed by downloading load module files with debug information.

Remark: Multiple load module files can be downloaded. Loaded files can be selected in the Load Module List Dialog Box that is opened by selecting [File] menu -> [Load Module].

Format of file that can be downloaded is as follows:

Table 5-3 Type of File That Can Be Downloaded

Format	Extension
Load module (ELF/CA850 (.out)) 3rd Party Load module (ELF/GHS Extended DWARF2 (.out))**Note1**	Load Module (*.out)
Intel Hex format (Standard, extension, and extension linear)**Note2**	Hex Format (*.hex)
Motorola Hex format S type (S0, S1, S2, S3, S5, S7, S8, S9 records)	
Extended Tektronix Hex format	
Hex format with ID tag for data flash	Hex Format with ID Tag (*.hex)
Binary data	Binary Data (*.bin)
Coverage result **[IECUBE]**	Coverage (*.cvb)

Note1: Compatible with GHS compiler V3.5.1, V4.0.x

Note2: Addresses of 1 MB or more can be downloaded. (Intel Hex Format)

Remark: The format of a *.hex file is automatically determined.

5.2.2 Downloading to External Flash Memory

The ID850QB can download load modules and HEX files to a flash memory connected to the external bus of the target microcontroller.

To correctly download modules and files to the flash memory, be sure to read the following.

(1) Confirm supported emulators

The following emulators are supported.

IECUBE, MINICUBE, N-Wire CARD, RTE-2000H-TP

Caution: Whether downloading programs to an external flash memory using MINICUBE2 is possible depends on the specifications of the debug monitor program. Support is under discussion.

(2) Prepare a flash information file (FDB file) and confirm the supported flash memory

An FDB file is necessary for downloading to the flash memory. Download the FDB file from the following website (Development Tools Download webpage). A readme file exists in the compressed folder storing the FDB file. The supported flash memories are shown in this file. Be sure to read this file and check if the flash memory to be used is supported.

http://www.necel.com/micro/ods/eng/

(3) Downloading procedure

Download data to the flash memory in the following procedure.

1) Mapping

   Map the target flash memory in the mapping area of the Configuration Dialog Box. Specify the mapping attribute as "Target".

2) Registering flash memory information

   Open the Console Window and register flash memory information on the command line. For how to register the information, refer to the description of the efconfig command.

3) Setting of external bus

   Change the peripheral I/O register setting so as to use external buses, which enables accessing from the target device to flash memory.

   This setting can be changed in the IOR Window, but use of the Hook window (an expansion window) is recommended, because the setting must be changed for individual registers.

   Register settings can be changed at a time before downloading programs, by performing the setting in the [BeforeDownload] tab in the Hook window. Processing will be made more efficient by including command processing performed in step 2 into the code.

4) Downloading programs

   Download programs via the Download Dialog Box.

   When using an E2 core device, addresses in internal instruction RAM and external spaces may overlap. To handle such a case, select "to external FlashROM" to give priority to downloading flash memory in the external space.

(4) Cautions

- Data cannot be written to the external flash memory from the Memory Window or the like (can be read, however).
- Sectors that are protected cannot be erased or written.
- If the device has a function to prohibit erasing and writing when power is turned on/off, it cannot be erased or written, because a dedicated unlock command is not supported.
- Special sectors such as Secured Silicon Sector area that can permanently hold Electric Serial Numbers which can be randomly assigned cannot be accessed (read, erased, or written), because no dedicated command is supported.

5.2.3 Upload

Uploading of memory contents, etc., is performed in the Upload Dialog Box. The saving range can be set.

Format of file that can be uploaded is as follows:

Table 5-4 Type of File That Can Be Uploaded

Format	Extension
Intel Hex format**Note1**	Hex Format (*.hex)**Note2**
Motorola Hex format S type (S0, S3, S7 - 32 bit-address)	
Extended Tektronix Hex format	
Binary data	Binary Data (*.bin)
Coverage results **[IECUBE]**	Coverage (*.cvb)

Note1: Standard (16-bit addresses), extension (20-bit addresses), and extension linear (32-bit addresses) Addresses of 1 MB or more can be uploaded. (Intel Hex Format)

Note2: One of the formats can be specified when saving a *.hex file.

5.3 Source Display, Disassemble Display Function

Source file display is performed in the Source Window. Disassemble display and line assembly are performed in the Assemble Window.

This section explains the following items:

- Source display
- Disassemble display
- Mixed display mode (Source Window)
- Convert symbol (symbol to address)

Remark: The locations for which coverage measurement is executed in the user program are displayed in the Source Window and Assemble Window. (Refer to "5.11.3 Display of locations for which coverage measurement is executed".)

5.3.1 Source display

The corresponding text file is displayed in the Source Window by downloading a load module file having debug information.

The display start position can be changed in the Source Text Move Dialog Box displayed by selecting [View] menu -> [Move...].

Specifications related to the tab size, display font, etc., and specification of the source path are made in the Debugger Option Dialog Box. Specify a searching method in the Source Search Dialog Box opened by clicking the <Search...> button. The search result is highlighted in the Source Window.

Table 5-5 File Type Can Be Displayed

File Type (Extension)	Meaning
Source (*.c, *.s)	Source file (The extension can be changed in the Debugger Option Dialog Box.)
Text (*.txt)	Text file
All (*.*)	All files

5.3.2 Disassemble display

Disassemble display is performed in the Assemble Window.

The display start position can be changed in the Address Move Dialog Box opened by selecting [View] menu -> [Move...].

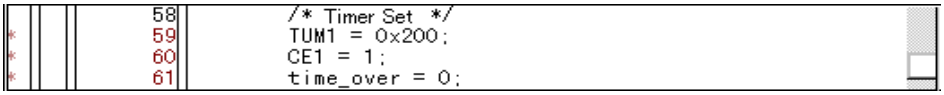
Offset display and register name display are specified in the Debugger Option Dialog Box.

Specify a searching method in the Assemble Search Dialog Box opened by clicking the <Search...> button. The search result is highlighted in the Assemble Window.

5.3.3 Mixed display mode (Source Window)

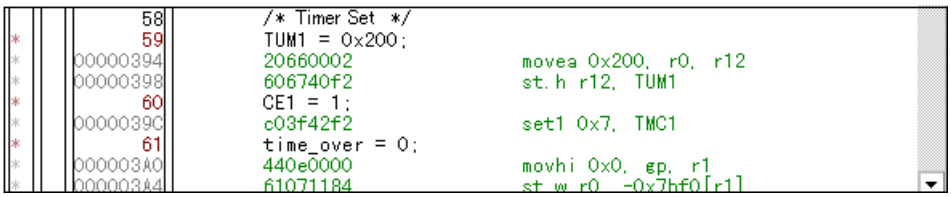
Programs can be disassembled and displayed combined with the source file by selecting [View] menu -> [Mix] in the Source Window. The contents displayed in the mixed display mode can be saved as a view file.

Normal display mode



In the normal display mode, general text files can be displayed as well as source files.

Mixed display mode



If a program code corresponds to the line of the displayed source file, the disassembly line is displayed next to the source line. The label of the address, code data, and disassembled mnemonic are displayed (the display start position of the mnemonic is adjusted by the set value of the tab size).

Caution1: The mixed display mode is valid only when the load module is downloaded and the symbol information is read, and the corresponding source file is displayed.

Caution2: The disassembled code cannot be edited in the Source Window, even if it is in the mixed display mode. To edit the disassembled code, use the Assemble Window.

Remark: When scrolling is performed using the cursor keys in the Mixed display mode, excessive scrolling may occur. Also, scrolling down to the last line may not be possible using the cursor keys.

5.3.4 Convert symbol (symbol to address)

In the Symbol To Address Dialog Box, can be displayed the address of the specified variable or function, or the value of the specified symbol.

Convert symbol is performed by selecting the character string to be converted in the Source Window or Assemble Window, and then selecting context menu -> [Symbol...].

The Specification symbols is indicated below.

Table 5-6 Specifying Symbols

Conversion Target	Specification Method
Variable	var file#var (to specify a static variable with file name) file#func#var (to specify a static variable with file name and function name) prog$file#func#var (to specify a static variable with program name, file name and function name)
Function	func file#func (to specify a static function with file name) prog$file#func (to specify a static variable with program name and file name)
Label	label file#label (to specify a local label with file name) prog$file#label (to specify a local label with program name and file name)
Line number of source file	file#no prog$file#no
I/O port name	portname
IOR name	I/O regname
Register name	regname
PSW flag name	pswname

Remark1: Separator "#"

"#" is used as a separator for file names, variables, function names, and line numbers. If a specified symbol is not found in the scope, all symbols (static variables, static functions, local labels) are searched.

Remark2: Separator "$"

To specify a load module name when two or more load modules are read, use "$" as a separator to delimit the load module name from a file name, variable, function name, or symbol name.

In the default status, a symbol name takes precedence. To temporarily change the priority, prefixing "$" to a symbol gives the priority to a register name.

5.4 Break Function

The break function is used to stop execution of the user program by the CPU and operation of the tracer.

This section explains the following items:

- Break types
- Breakpoint setting
- Setting breaks to variables
- Hardware break and software break
- Fail-safe break function [IECUBE]
- Cautions

5.4.1 Break types

The ID850QB has the following break functions.

Table 5-7 Break Types

Item	Contents
Hardware break **Note1** (Event detection break)	Function to stop user program execution upon detection of the set break event condition. -> Refer to "5.4.2 Breakpoint setting".
Software break **Note1**	Function to replace the instruction at the specified address software break instruction and stop the user program executed. (Refer to "5.4.4 Hardware break and software break".) -> Refer to "5.4.2 Breakpoint setting".
[Come Here] break **Note2** (Simple break)	Function to stop user program execution selected by selecting [Run] menu -> [Come Here] upon detection of address specified in the Source Window or Assemble Window.
Break on satisfaction of condition of step execution	Function to stop execution upon satisfaction of the stop condition of each command ([Step In], [Next Over], [Return Out], [Slowmotion]).
Forced break	Function to forcibly stop execution by selecting [Run] menu -> [Stop], or selecting the STOP button. It is valid for all the execution commands.
Fail-safe break **[IECUBE]**	Function to forcibly stop execution when the user program performs an illegal operation in relation to the memory or registers. (Refer to "5.4.5 Fail-safe break function [IECUBE]".) -> Refer to " Fail-safe Break Dialog Box".
Time-out break **[IECUBE]**	Function to stop user program execution when the measurement time exceeds the specified time-out time. (Refer to "5.9 Timer Function [IECUBE]".) -> Refer to " Timer Dialog Box".

Note1: This break is valid for [Go], [Go & GO], [Come Here] and [Restart]. (Refer to "Table 5-9 Type of Execution".)

Note2: After user program execution has been stopped, the breakpoint by this function is eliminated. During execution of a user program by this function, break events set before the cursor position does not occur.

5.4.2 Breakpoint setting

Breakpoints can simply be set to the desired location by clicking in the Source Window or Assemble Window.

Since breakpoints are set as break event conditions and managed using the Event Function, restrictions apply to the number of breakpoints that can be set. (Refer to "5.12.4 Number of enabled events for each event condition".)

(1) Breakpoint setting method

Breakpoints are executed by clicking lines in which " * " is displayed (lines where program code exists).

In the default setting, software breakpoint (B) is set, but if [Breakpoint] is selected in the context menu, hardware breakpoint (B, or B) is set. (Refer to "5.4.4 Hardware break and software break".)

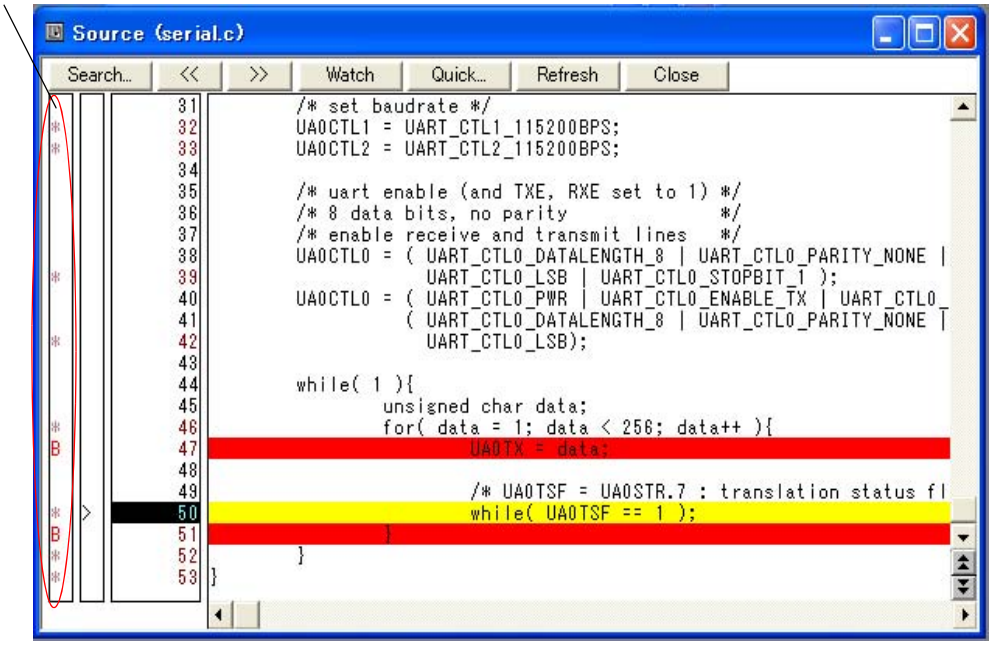
If a breakpoint is set on a line on which an event breakpoint has already been set, "A" indicating that multiple events have been set is marked. (Refer to "Table 6-13 Event Setting Status (Event Mark)".)

Caution: A software breakpoint cannot be set/delete in an externally mapped ROM area.

Remark: Breaks set by default can also be changed in the Extended Option Dialog Box.

Figure 5-1 Breakpoint Setting

Click the asterisk (*; program code) in this area.



(2) Deleting a breakpoint method

Click the position at which the breakpoint to be deleted is set.

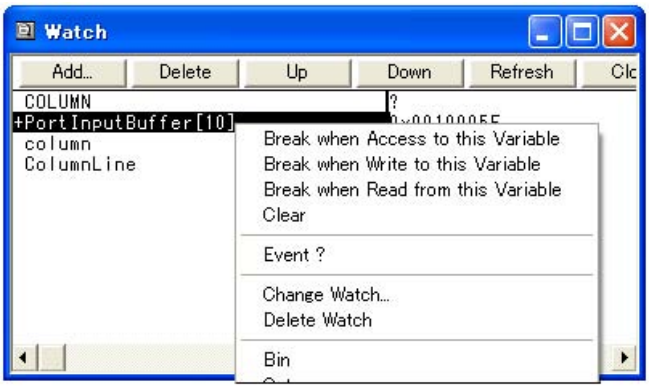
At the same time as setting is performed, in the default setting, software breakpoint (B) is deleted, but if [Breakpoint] is selected in the context menu, hardware breakpoint (B, or B) is deleted.

As a result of deletion, If another event remains, however, the mark of that event is displayed.

5.4.3 Setting breaks to variables

Access breaks can easily be set to variables from the context menu in the Source Window or Watch Window.

Figure 5-2 Setting Break to Variable



5.4.4 Hardware break and software break

(1) Hardware break

Hardware breaks are breaks that are set using one hardware resource per event condition.

Therefore, in the ID850QB, they are managed using "5.12 Event Function" as break event conditions.

The number of valid break points varies depending on the device (Refer to "5.12.4 Number of enabled events for each event condition".)

(2) Software break

Software breaks are breaks that are set by rewriting instructions of specified addresses to software break instructions. Settings to external ROM, stopping at variable access timing, etc., cannot be specified.

The number of valid software break is as follows:

Table 5-8 The Number of Valid Software Break

Connected IE	Valid Number
[IECUBE]	2000
[MINICUBE] **[MINICUBE2]**	2000[Note]

Note: Software breaks in relation to internal ROM and internal flash memory are automatically set by the ROM collection function.

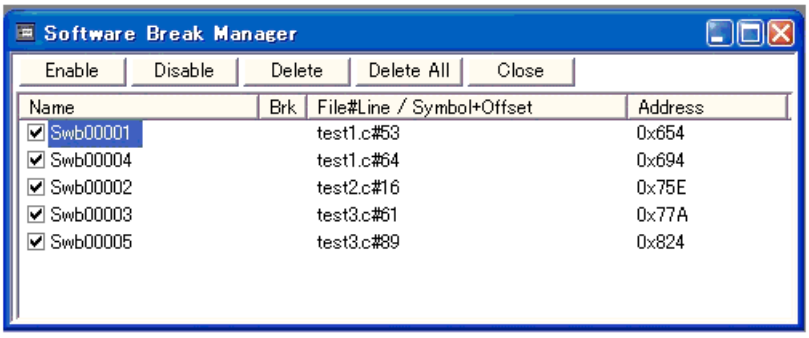
The maximum number of software breaks that can be set with the ROM collection function depends on the product (4). Moreover, the software breaks set with the ROM collection function are temporarily disabled by target reset or internal reset, but they are enabled when a break occurs.

Caution: When the Pseudo real-time monitor function (Break When Readout) is enabled, no software break points can be set.

When a valid software break point has been set, writing during user program execution is disabled (DMM Function). **[IECUBE]**

Software break is managed by the Software Break Manager.

Figure 5-3 Management of Software Breaks



5.4.5 Fail-safe break function [IECUBE]

The fail-safe break settings are performed in the Fail-safe Break Dialog Box.

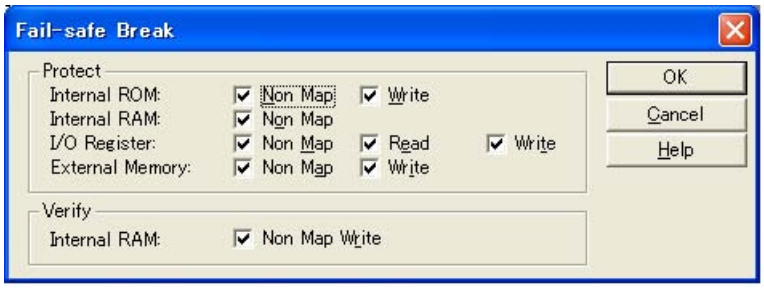
Individual settings are possible by selecting checkboxes.

Remark: However, the protect setting for the internal RAM area is performed through verify processing by software, and therefore a warning is displayed during breaks.

During IOR Illegal and internal RAM verify checks, the address is displayed on the status bar.

Verify is performed at 0x00.

Figure 5-4 Fail-safe Break Setting



5.4.6 Cautions

Note the following points regarding the break functions.

(1) The PC indicates the address after halt if a break occurs in the HALT status.

(2) The access event break is delayed (the specified address is passed before execution stops).

(3) When a download or project file load is performed, the hardware breakpoints or events may shift in the middle of an instruction. Delete the hardware breakpoints or events and re-set them.

(4) When a software breakpoint has been set in a module file with no debug information and a download or project file load is performed, the software breakpoint will be deleted. Re-set the breakpoint.

(5) A reset signal from the target system is masked during a break and the CPU or peripheral I/O cannot be reset. In addition, the CPU or peripheral I/O is not reset normally if a reset signal from the target system or internal reset occurs when the memory contents are overwritten with the DMM function or read with the pseudo RRM function during user program execution.

(6) When setting, changing or deleting a breakpoint, trace conditions or timer conditions during program execution, the execution is stopped. Therefore, the break does not take effect if an event break or software break occurs when a breakpoint, trace conditions, or timer conditions are set during user program execution.A break also does not occur if an event break or software break occurs when rewriting the memory contents using the DMM function or reading the memory contents using the pseudo RRM function.

(7) When NMI2 is input in a device with NMI2, the NMI2 interrupt routine of the user program is executed even if a break is taking effect. Do not input NMI2 during a break period. **[MINICUBE] [MINICUBE2]**

(8) If a breakpoint is set in the vicinity of address 0 in the D70F3166, the error message " F0c25: Flash macro service ROM was accessed or stepped in." will be displayed as a result of target reset or internal reset generated by the watchdog timer. **[MINICUBE] [MINICUBE2]**

5.5 Program Execution Function

The program execution function is used to start/stop execution of the user program by the CPU and operation of the tracer.

Through user program execution, the program counter (PC) advances until the set breakpoint or forced break. (Refer to "5.4 Break Function".)

Remark: While the user program is being executed, trace event condition and timer event condition can be set. (Refer to " Trace Dialog Box", " Timer Dialog Box".) **[IECUBE]**

This section explains the following items:

- Execution types
- Cautions

5.5.1 Execution types

The following types of ID850QB execution functions are provided. They are operated using the execution buttons on the toolbar , or from the [Run] menu.

Figure 5-5 Execution Button

Figure 5-6 [Run] Menu

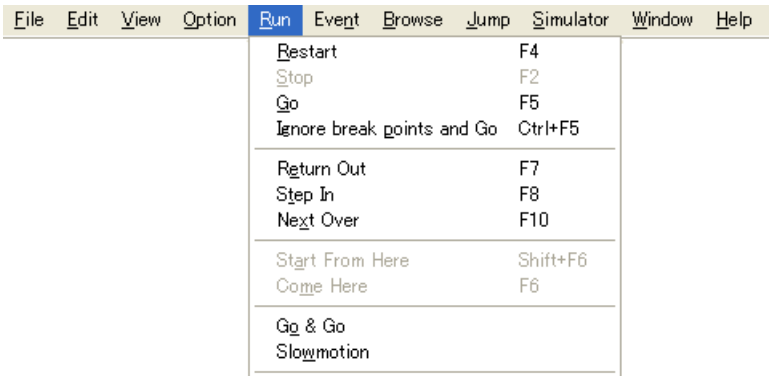


Table 5-9 Type of Execution

Items	Contents
[Restart] 	The CPU is reset and the user program is executed starting from address 0. This is the same operation as "resetting the CPU before execution of the user program and executing [Go]".
[Go] 	The user program is executed starting from the address indicated by the current PC register, and execution continues until a break condition is established.
[Ignore break points and Go] 	The user program is executed starting from the address indicated by the current PC register Execution of the user program continues, ignoring set breakpoints.
[Return Out] 	The user program is executed until execution returns to the calling function described in C language.
[Step In] 	In the source mode,Step execution of one line of the source text is performed starting from the current PC register value and the contents of each window are updated. In the instruction mode,One instruction is executed from the current PC register value and the contents of each window are updated.
[Next Over] 	jarl instruction: Next step execution is performed, assuming the function or subroutine called by the jarl instruction as one step (step execution continues until the nesting level becomes the same as when the jarl instruction was executed). Instruction other than jarl: The same processing as [Step In] is performed.
[Start From Here]	This command executes the user program starting from the specified address. Execution of the user program is stopped when a set break event condition is satisfied.
[Come Here]	The user program is executed from the address indicated by the current PC register to the address selected in the line/address display area of the Source Window or Assemble Window, and then a break occurs. While the user program is being executed, the break event currently set does not occur.
[Go & Go]	The user program is executed starting from the address indicated by the current PC register and stopped if a set break event condition is satisfied. The contents of each window are updated, and execution of the user program is resumed from the address at which the program was stopped. This operation is repeated until the user executes [Stop].
[Slowmotion]	Step execution of one line is performed from the address indicated by the current PC register value in the source mode. In the instruction mode, step execution of one instruction is performed. The contents of each window are updated each time step execution is performed. This operation is repeated until the user executes [Stop].
[CPU Reset] 	CPU is reset.
[Stop] 	Forcibly stops program execution.

5.5.2 Cautions

Note the following points regarding the program execution functions.

(1) If a write instruction for the PRCMD or PHCMD register, which is performed immediately before an instruction, is performed one by one with I/O registers that require a specific sequence, or if an instruction is executed from such instructions, the write instruction is not performed normally.

(2) If a software break or hardware break before execution is set to an instruction located at the PC, a step-wise execution is first performed and then real-time execution is performed. This causes an error in the time measurement result in the timer. In addition, when the program operation is checked using the oscillator or logic analyzer, the measured timing may differ between when [Go] is executed at a certain location and [Go] is executed one instruction before that location.

(3) If return execution is performed when a function is recursively called (stack is generated by the recursive processing), the PC moves to the position where the processing of the function called last (leaf function) ended. Even if this symptom appears, the subsequent operation is performed normally.

Example If the same function is called five times because of recursive processing

1:main()
2:fnuc01() Function is called. Execution exits from function.
3:func01() ↓ (*) ↑
4:func01()
5:func01()
6:func01()

If return execution (that generates the stack) is performed when functions are called in the order of 2, 3, 4, 5, and 6 (*), the address moves the position at which processing 6 is completed. If return execution (which deletes the stack) is performed when execution exits from functions 6, 5, 4, 3, and 2, in that order, execution correctly returns to the main function, from 5 to 4, from 3 to 2, and so on.

(4) Assembler instructions enclosed by “#pragma asm” and “#pragma endasm” can be executed step-wise in the source mode. The instructions written in a “_asm()” statement cannot be executed.

(5) If step-wise execution is performed in the source mode, it is judged whether an interrupt is serviced, based on the NP, EP, and ID flags of the PSW register. If the above flags or registers have been changed because nesting is used, return execution and stack display may not be correctly executed.

(6) The static functions described in the header file cannot be stepped into by step-wise execution. An #include statement cannot be stepped into nor can breakpoints be set.

(7) An NMI and other interrupts are not acknowledged during step-wise execution.

(8) In the conditional statement of an if-else statement, a line that should not be executed may be passed.When such a case occurs, select the mixed display mode in the Source window and confirm that the else statement has not been executed.

(9) A function that has been expanded in-line cannot be stepped in. Because the original function code is created separately from the part that has been expanded inline, it is possible to set an event there, but the event does not occur because the original code is not executed (whether inline expansion has been performed can be checked by the mixed display on source window).

(10) When two instructions are executed simultaneously in a program, be aware of step-wise executions and breaks based on the breakpoint setting.

Refer to examples 1 to 3 below.

<Example 1>

Two instructions are stepped from Address A, where one instruction should be stepped.

Address A: MOV r1, r2

Address A+2: XOR r1, r2

<Example 2>

When a breakpoint before execution is set at address A+2 and [Go] is executed, a break does not occur at address A+2.

Address A: MOV r1, r2

Address A+2: XOR r1, r2 <--- A breakpoint before execution

<Example 3>

When a hardware breakpoint after execution or a software breakpoint is set at address A+2 and [Go] is executed, a break occurs at address A+2.

Address A: MOV r1, r2

Address A+2: XOR r1, r2 <--- A breakpoint after execution/software breakpoint

5.6 Watch Function

This section explains the following items related to the watch function:

- Displaying and changing data values
- Displaying and changing local variable values
- Registering and deleting watch data
- Changing watch data
- Temporarily displaying and changing data values
- Callout watch function
- Stack trace display function

5.6.1 Displaying and changing data values

Data values are displayed and changed in the Watch Window. Shifts in data values can be checked by registering watch data.

The display format is specified in the Debugger Option Dialog Box.

Figure 5-7 Watch Window

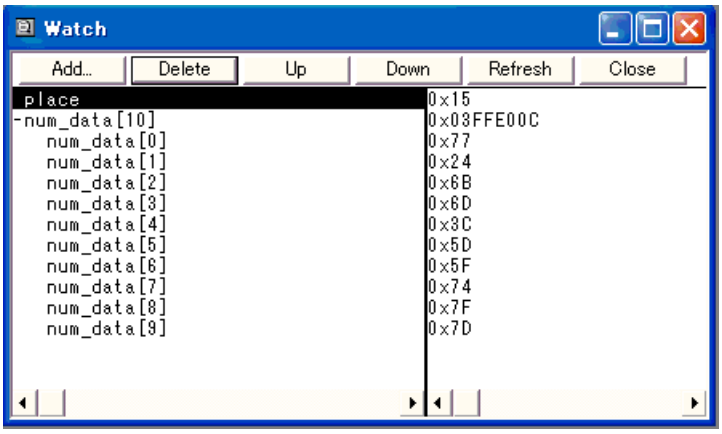
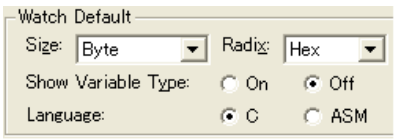


Figure 5-8 Specification of the Display Format (Debugger Option Dialog Box)

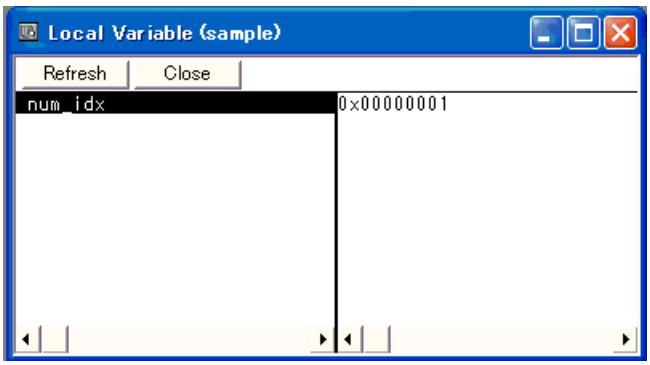


5.6.2 Displaying and changing local variable values

Local variables are displayed and changed in the Local Variable Window.

Local variables within the current function are automatically displayed in this window. (Variable addition/deletion is not possible.)

Figure 5-9 Local Variable Window



5.6.3 Registering and deleting watch data

Data can be registered to the Watch Window from the Source Window or Assemble Window. This is simply done by selecting the variable or symbol name in the respective window, and then clicking the <Watch> button. Registration is also possible with the following method.

- Drag and drop the selected variable or symbol name directly on the Watch Window. (Refer to "5.16.4 Drag & drop function".)
- Click the <Add> button in the Quick Watch Dialog Box or Add Watch Dialog Box.

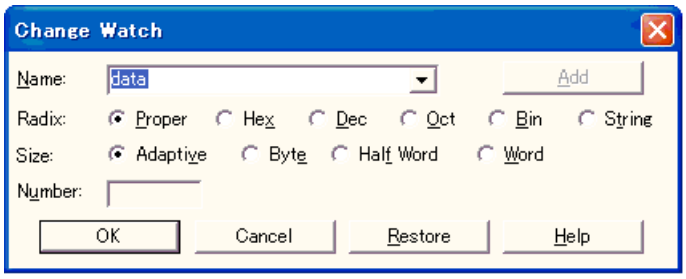
To delete watch data, click the variable name or symbol name (multiple selections can also be made using the Shift key or Ctrl key), and then click the <Delete> button. However, lines with an expanded hierarchy, such as elements of an array, and members of structures and unions, cannot be deleted.

5.6.4 Changing watch data

Watch data is changed in the Change Watch Dialog Box.

Note that the symbol name can be changed even if it results in duplication of a name already in use with existing data.

Figure 5-10 Change Watch Dialog Box



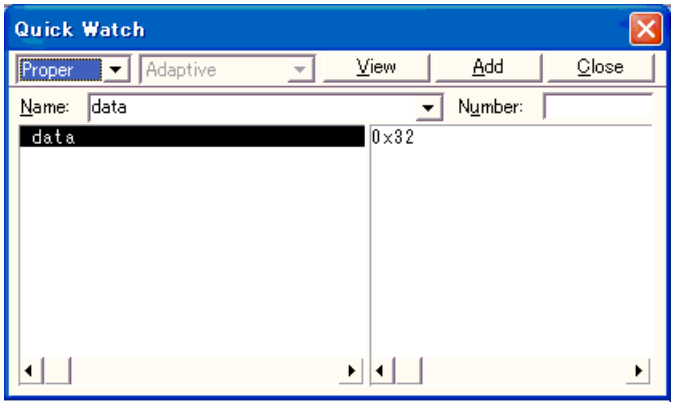
5.6.5 Temporarily displaying and changing data values

Data values are temporarily displayed and changed in the Quick Watch Dialog Box.

Select the desired variable or symbol name in the Source Window or Assemble Window and click the <Quick...> button to perform watch data registration.

The display radix, display size, and display number can be changed in this window.

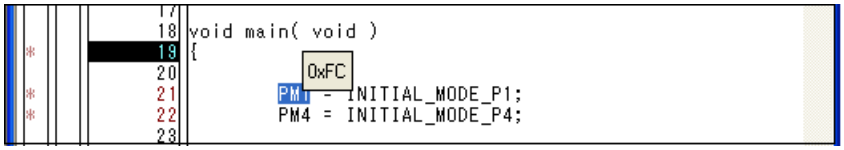
Figure 5-11 Quick Watch Dialog Box



5.6.6 Callout watch function

The corresponding variable value pops up when the mouse cursor is placed over a selected variable in the Source Window or Assemble Window.

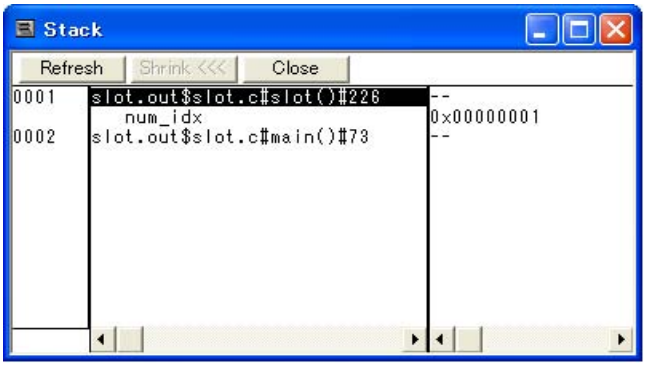
Figure 5-12 Callout Watch Function



5.6.7 Stack trace display function

This function displays the stack contents of the current user program in the Stack Window.

Figure 5-13 Stack Window



5.7 Memory Manipulation Function

This section explains the following items related to the memory manipulation:

Verify check, etc., is specified in the Extended Option Dialog Box.

- Displaying and changing memory contents
- Access monitor function [IECUBE]
- Filling, copying, and comparing memory contents
- Flash memory writing function [MINICUBE] [MINICUBE2]

5.7.1 Displaying and changing memory contents

In the Memory Window, the memory contents can be displayed or changed by using mnemonic codes, hexadecimal codes, and ASCII codes. Searching is done in the Memory Search Dialog Box displayed by clicking the <Search...> button. The results of search is highlighted in the Memory Window.

The display start position can be changed in the Address Move Dialog Box displayed by selecting [View] menu -> [Move...].

The variables and data allocated to the sampling range can be displayed in real time even during program execution. (Refer to "5.13 RRM Function".)

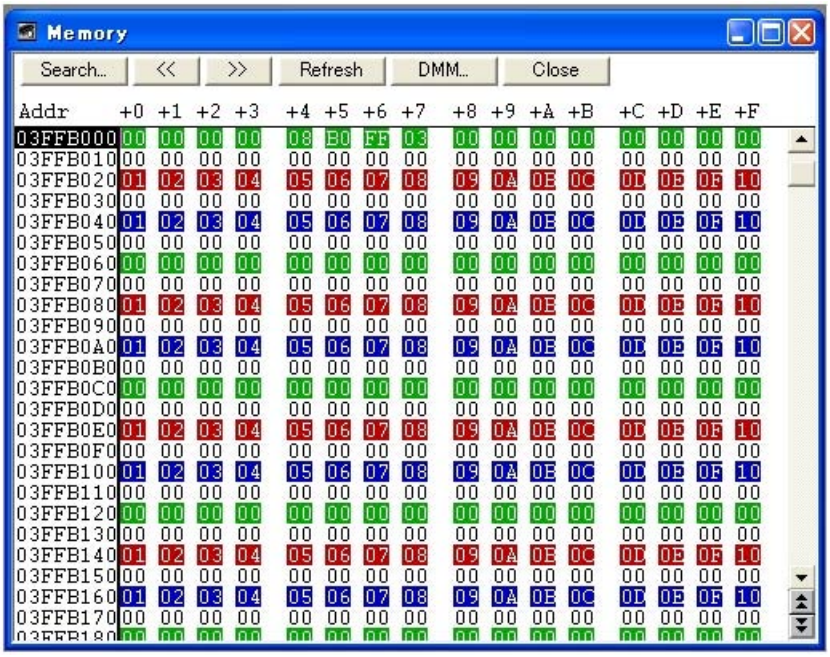
5.7.2 Access monitor function [IECUBE]

The access monitor function displays the access status (read, write, read & write) for the sampling range of the The RRM Function using different colors in the Memory Window. The access monitor view is available only when "Byte" is selected for the display units. Colors are not displayed in the ASCII display area. Cumulative display setting and access status display can be cleared by selecting [View] menu -> [Access Monitoring].

Caution1: The value of memory rewritten via DMA during program execution, and the value of memory rewritten from the debugger cannot be displayed on the access monitor.

Caution2: This function is enabled only when [Option] menu -> [RRM Function] is selected.

Figure 5-14 Access Monitor Function (Memory Window)



5.7.3 Filling, copying, and comparing memory contents

Memory contents are Filled, copied, and compared in the Memory Fill Dialog Box, Memory Copy Dialog Box, and Memory Compare Dialog Box displayed by selecting [Edit] menu -> [Memory] -> [Fill.../Copy.../Compare...].

The comparison results are displayed in the Memory Compare Result Dialog Box.

5.7.4 Flash memory writing function [MINICUBE] [MINICUBE2]

With the ID850QB, the internal flash memory can be written and the load module can be downloaded by the same access method as an ordinary memory operation.

The data on the internal flash memory can be changed from the Memory Window, Assemble Window, Watch Window, Memory Fill Dialog Box and Memory Copy Dialog Box, without having to be aware that the data is that of the internal flash memory. The load module can also be downloaded to the internal flash memory by using the flash self programming function. (Refer to " Flash Option Dialog Box" and " Data Flash Option Dialog Box".)

Caution1: No data can be written to the internal flash memory during user program execution.

Caution2: Downloading data to the on-chip flash memory cannot be cancelled when it is in progress.

Caution3: If the [Execute Symbol Reset after Download] check box is selected in the Debugger Settings dialog box of PM+ when downloading data from PM+ to the on-chip flash memory, the data in the flash memory will be erased before downloading data.

Remark: With the ID850QB, the remaining area contents after the load module was downloaded to the internal flash memory are erased.

5.8 Register Manipulation Function

This section explains the following items related to the register manipulation function.

- Displaying and changing register contents
- Displaying and changing peripheral I/O registers contents
- Displaying and changing I/O port contents

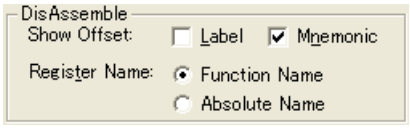
5.8.1 Displaying and changing register contents

Register contents can be displayed and changed in the Register Window.

Register name display switching (absolute name/function name) can be done in the Debugger Option Dialog Box.

Remark: The display register is selected in the Register Select Dialog Box.

Figure 5-15 Absolute Name/Function Name Switching



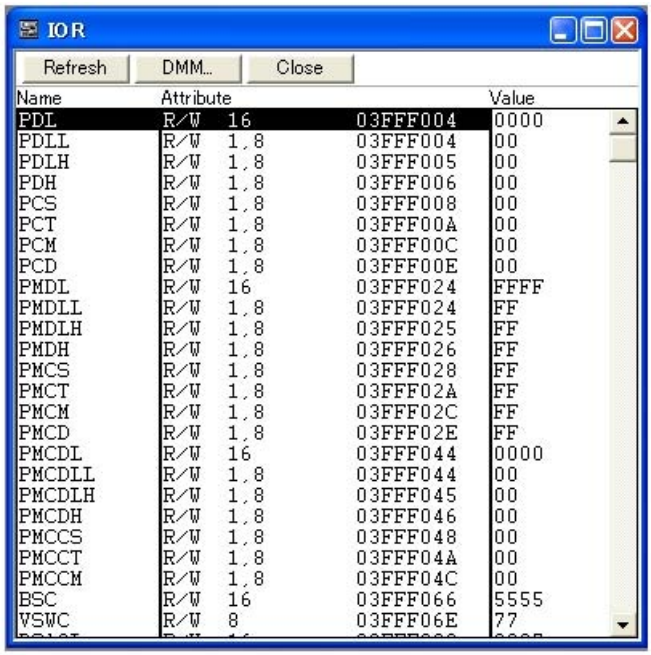
5.8.2 Displaying and changing peripheral I/O registers contents

The peripheral I/O registers contents can be displayed and changed in the IOR Window.

The display start position can be changed in the Address Move Dialog Box displayed by selecting [View] menu -> [Move...].

The display register is selected in the IOR Select Dialog Box.

Figure 5-16 Display IOR contents

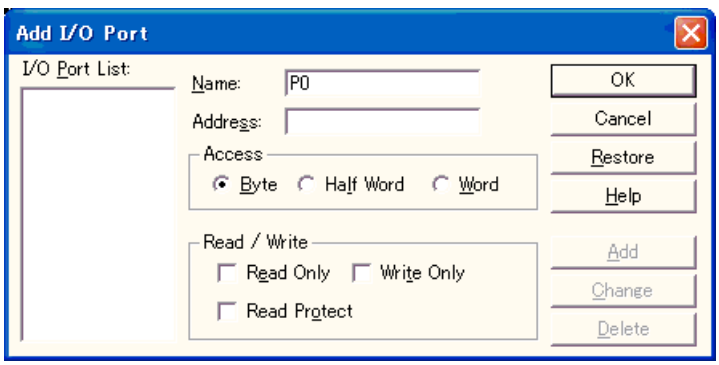


5.8.3 Displaying and changing I/O port contents

User-defined I/O ports can be displayed and changed in the IOR Window once they have been registered in the Add I/O Port Dialog Box.

In the case of products that support programmable I/O registers, programmable I/O register contents can be displayed and changed by setting programmable I/O area use in the Configuration Dialog Box.

Figure 5-17 Register I/O Port



5.9 Timer Function [IECUBE]

The timer function measures the execution time (run-break time) from the start of user program execution until a break, or the execution time in a specific user program interval using timer events.

The ID850QB timer function performs measurements using an external clock. Therefore, the measurable time differs based on the setting in "Table 6-7 Relationship Between Timer Count Division Ratio and Maximum Measurement Time (Timer counter (Timer))".

The Run-break time is also displayed in the status bar in the Main Window.

Caution1: The time measured using the time measurement function is illegal in the following cases.

- The PRM window of the Expansion window is open during program execution.
- A hardware break or software break is set during program execution.
- A value is written to the memory using the DMM function during program execution.

Caution2: If time is measured with a resolution lower than the one determined by the division ratio, the measurement result is not displayed.When time is measured with a 4K-division ratio and a resolution lower than 81,920 ns, the measurement result is not displayed in the case of section measurement. In the case of Run-Break, the measurement "pass = 1 and total = 0" is displayed.

This section explains the following items:

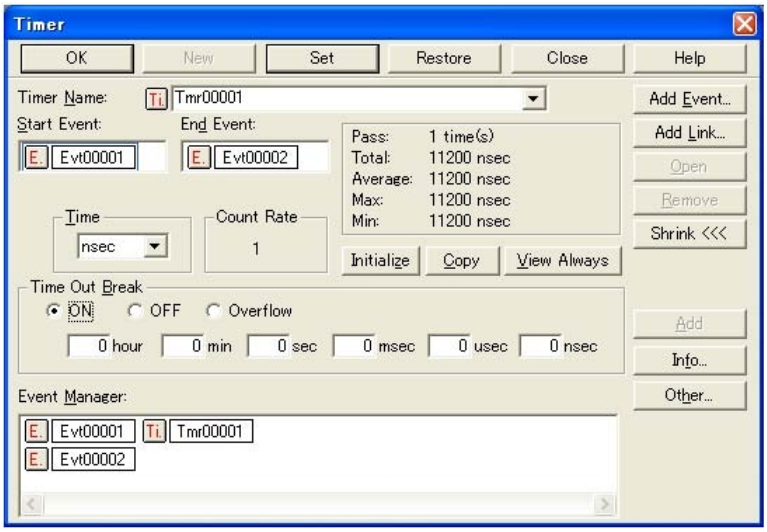
- Timer event conditions
- Run-Break event
- Cautions

5.9.1 Timer event conditions

A timer event condition specifies the trigger by which time measurement is started or stopped. Timer event conditions are set in the Timer Dialog Box. (Refer to "5.12 Event Function".)

In the ID850QB, time-out break settings can be performed in the Time Out Break area.

Figure 5-18 Sets and Displays Timer Event (Timer Dialog Box)



Continuous display in the Timer Result Dialog Box can be selected by clicking the <View Always> button.

Timer manipulations during program execution are performed by selecting [Run] -> [Timer Start/Timer Stop].

5.9.2 Run-Break event

Run-Break event is a timer event name given to a timer event condition that measures the execution time from execution to break. Run-break events are registered in advance and the run-break time can be displayed through specification in the Timer Dialog Box.

The Run-break time is also displayed in the status bar in the Main Window.

Since Run-Break events are included in the number of timer events that can be simultaneously enabled (refer to "5.12.4 Number of enabled events for each event condition"), they can be used added to the number of valid timer event conditions.

5.9.3 Cautions

For IECUBE, the same timer count rate value is applied to all timer events. Therefore, the time set in (3) Time Out Break changes when the timer count rate at the time of the event creation (the value displayed in "Count Rate" is different from the current timer count rate value (the value set in (2) Timer [IECUBE] in the Extended Option Dialog Box).

Example:

In the case of a timer event whose timer count rate value at the time of the event creation is set to "16" and whose timeout time is set to "1 sec"

(1) When the current timer count rate value is "32"

->The current timer count rate value is two times higher than the value at the time of the event creation. This leads to the occurrence of a Timer Over Break in 2 seconds.

(2) When the current timer count rate value is "4"

->The current timer count rate value is a quarter of the value at the time of the event creation. This leads to the occurrence of a Timer Over Break in 250 m seconds.

Therefore, do not set the timeout break in the above case. (No problems occur when the timeout break is set to "OFF" or "Overflow.")

To set the timeout break, change the timer count rate value in (2) Timer [IECUBE] in the Extended Option Dialog Box, and reset the timer event.

5.10 Trace Function [IECUBE]

The trace function is used to save the history of the data indicating the execution process of the user program to the trace memory.

The DMA (Direct Memory Access) start point and end point are traced regardless of the trace condition. (Refer to "5.10.7 DMA point trace function".)

This section explains the following items:

- Trace memory
- Setting trace data
- Checking trace data
- Mixed display mode (Trace View Window)
- Tracer operation
- Setting conditional trace
- DMA point trace function
- Cautions

Caution: RRM Function, Trace Function [IECUBE] and Coverage Measurement Function [IECUBE] are functions that are used on a mutually exclusive basis. (Refer to "5.11.4 RRM function, trace function, and coverage function used on a mutually exclusive basis".)
To switch between the three functions, go to the [Option] menu.

5.10.1 Trace memory

ID850QB has trace memory with a ring structure. Size specification is done in the Extended Option Dialog Box.
The maximum trace memory capacity is as follows.

Table 5-10 Trace Memory Size

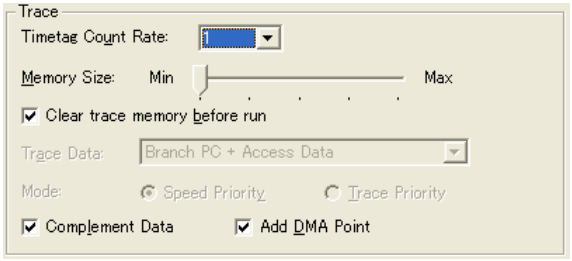
Connected IE	Maximum Value
[IECUBE]	256 KB

5.10.2 Setting trace data

The detailed settings for the collected traced data are done in the Extended Option Dialog Box.

Complement display of instructions between branch instructions that cannot be traced by hardware is possible in the complement mode (enabled by selecting the Complement Data area checkbox). When the complement mode is enabled, assemble display of the internal ROM area is possible during user program execution (while the tracer is stopped).

Figure 5-19 Setting Trace Data



5.10.3 Checking trace data

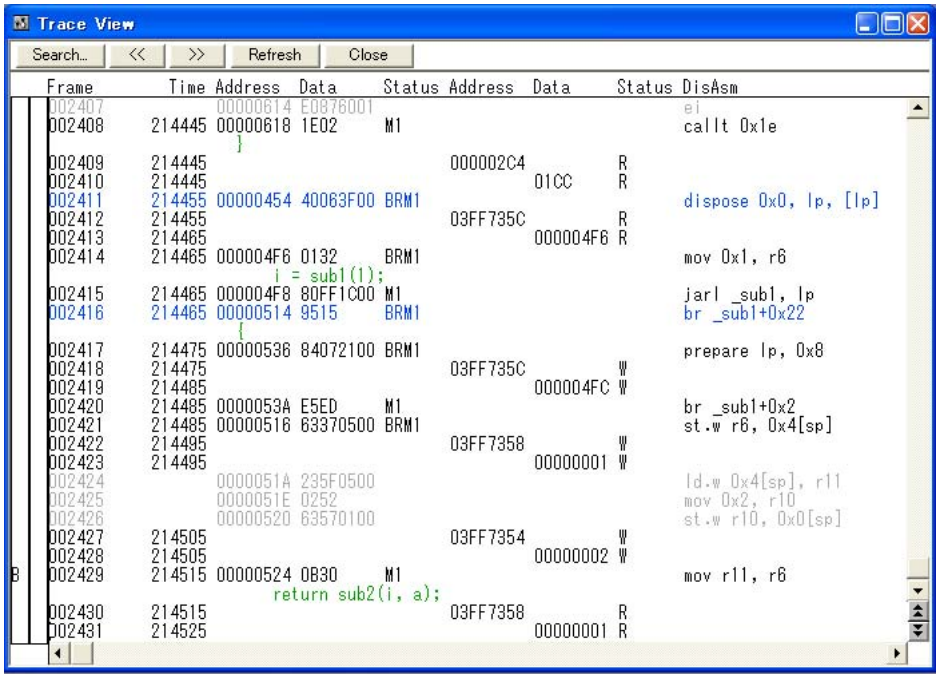
The trace data saved to the trace memory can be checked in the Trace View Window.Trace data can be searched in the Trace Search Dialog Box displayed by clicking the < Search...> button.

The display start position can be changed in the Trace Move Dialog Box displayed by selecting [View] -> [Move].

The display items in the Trace View Window can be selected in the Trace Data Select Dialog Box.

This area is used to set the division ratio of the counter used for time tag display in the Trace View Window. The division ratio is set in the Extended Option Dialog Box. Setting a time tag counter, count rate, and total time tag are performed in the Extended Option Dialog Box.

Figure 5-20 Checking Trace Data



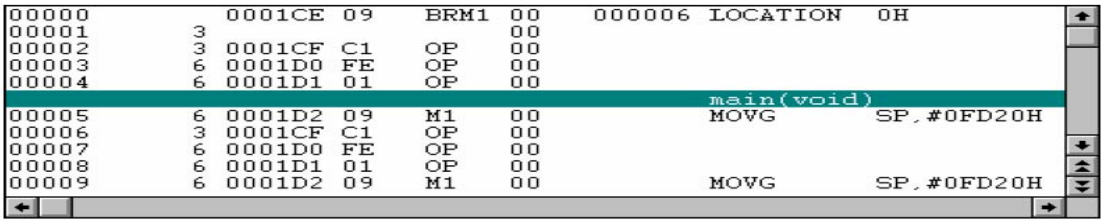
5.10.4 Mixed display mode (Trace View Window)

Source file display combined with trace results can be done by selecting [View] -> [Mix] in the Trace View Window (mixed display mode).

If a program code corresponds on the program fetch address to be displayed, a source file line is displayed before the line indicating the result of tracing that program fetch address.

The source file line is displayed, emphasized in green.

Mixed display mode



Caution: The mixed display mode is valid only when the load module has been downloaded and symbol information is read, and when a fetch address, fetch data, fetch status, or result of disassembly is displayed.

5.10.5 Tracer operation

The trace operation differs as follows according to the user program execution format and the tracer control mode.

Tracer manipulations during program execution are performed by selecting [Run] -> [Tracer Start/Tracer Stop].

(1) Operation during execution

The tracer operation differs as follows according to [Run] -> [Cond. Trace ON/Uncond. Trace ON] selection.

Table 5-11 Type of Trace Modes

Item	Contents
Unconditional trace	Trace is started when execution of user program, and ends when a break occurs. At this time, the set trace event conditions are ignored.
Conditional trace	Trace is started or stopped by the condition set in the Trace Dialog Box. (Refer to "5.10.6 Setting conditional trace".) If a break occurs while a trace is being executed, however, trace is stopped immediately.

(2) Operation during Step In execution

The tracer operates every step execution, and trace data of one step is successively added to the trace memory.

(3) Operation during Next Over execution

The operation of the tracer differs depending on the instruction to which Next Over is to be executed.

(a) jarl disp22, [lp] instruction

The jarl instruction and the subroutine that was called are traced.

(b) Other instructions

The same operation as that during Step In execution is performed.

(4) Tracer Control Mode

There are the following types of trace control mode. These trace mode settings are performed from the [Run] menu.

Table 5-12 Types of Tracer Control Mode

Mode	Contents
Non Stop	Goes around the trace memory and overwrites data from the oldest frame (default).
Full Stop	Goes around the trace memory and then stops the tracer.
Full Break	Goes around the trace memory and then stops the tracer and program execution
Delay Trigger Stop	Traces data by the number of delay count frames and stops the tracer when a delay trigger event has occurred.

5.10.6 Setting conditional trace

A trace event condition triggers starting/stopping trace execution when a conditional trace is set.

By setting a trace event condition in the Trace Dialog Box, the conditional trace can be set. (Refer to "5.12 Event Function".)

To use the conditional trace, select [Run] menu -> [Cond. Trace ON].

There are the following types of conditional trace.

Table 5-13 Types of Conditional Trace

Item	Contents, Setting method
Section trace	Executes a trace between two specified conditions (in a specific zone). A section trace can be executed by setting a trace start event and trace end event in the Trace Dialog Box and selecting [Run] -> [Cond. Trace ON].
Qualify trace	Executes a trace only when a condition is satisfied. If two or more events are set as qualify trace events, a qualify trace can be executed by executing a conditional trace. A qualify trace can be executed by setting a qualify trace event in the Trace Dialog Box and selecting [Run] -> [Cond. Trace ON].
Delay trigger trace	Executes a trace by the number of delay counts after a condition has been satisfied. A delay trigger trace can be executed by setting a delay trigger event in the Trace Dialog Box, setting a delay count in the Delay Count Dialog Box and selecting [Run] -> [Cond. Trace ON].

5.10.7 DMA point trace function

The DMA point trace (Direct Memory Access Trace) function is performed prior to normal trace functions.

For frames to be accessed using the DMA point trace function, the "M" mark is displayed in the Trace View Window.

Below are the types of DMA point trace function operations.

(1) During unconditional trace

Not only all the points that are traced using the normal all trace function but also the DMA start and end points are always traced using the DMA point trace function.

(2) During section trace

Not only the points that are traced using the normal section trace function but also the DMA start and end points, which may be located outside of the section-trace area, are always traced using the DMA point trace function.

(3) During qualify trace

Not only the points that are traced using the normal qualify trace function but also the DMA start and end points are always traced even when conditions for the qualify trace are not satisfied using the DMA point trace function.

5.10.8 Cautions

Note the following points regarding the trace functions.

(1) Disassemble display is not output in the Trace window when trace complement mode is off and execution of the user program is in progress.

(2) The read access frame and write access frame may be displayed in reverse in the Trace window.

(3) A large amount of invalid frames are output when step-wise execution is performed in the Trace window. The number of invalid frames can be reduced by setting the trace complement mode to ON.

(4) The RETI instruction allocated to address 0x7c is not traced.

(5) If the items Branch PC, Access DATA, and Access PC are selected for the trace function of the Extended Option Dialog Box, the same instruction (e.g. prepare, dispose, callt) is displayed two frames in succession in the Trace window. The frequency of this bug can be reduced by setting the trace complement mode to ON.Use a combination other than Branch PC and Access PC.

(6) A time measurement clock of 20 ns (50 MHz) is used for counting the time tag in the Trace window, and is not related to the actual CPU clock. An error of up to 32 CPU clocks occurs. In addition, an error occurs in the time tag in the following cases, because the CPU is stopped for a moment.

- When the RAM monitor function is used during program execution
- When a hardware break or software break is set during program execution
- When a value is written to the memory with the DMM function during program execution
- When the real-time monitor area is set or modified during program execution

(7) The time tag value in the Trace window is the integrated value, but the value may be smaller than the actual value, though this is unlikely. The frequency of this error can be reduced by raising the timer count rate with the Extended Option Dialog Box.

(8) When a break occurs at a software breakpoint, the instruction that sets the software breakpoint is traced as the executed instruction even though it has not been executed.Similarly, an unexecuted instruction is traced as it is executed when the coverage measurement function is used.

5.11 Coverage Measurement Function [IECUBE]

Although there are several types of coverage measurement, the ID850QB performs measurement for C0 coverage.

C0 coverage (instruction coverage): A percentage that all statements in a code are executed at least once

Download or upload the coverage measurement result (coverage data) via the Download Dialog Box or Upload Dialog Box, respectively.

This section explains the following items:

- Coverage mesurement result display
- Coverage measurement range
- Display of locations for which coverage measurement is executed
- RRM function, trace function, and coverage function used on a mutually exclusive basis

Caution1: This function is disabled when no coverage boards are incorporated.

Caution2: RRM Function, Trace Function [IECUBE] and Coverage Measurement Function [IECUBE] are functions that are used on a mutually exclusive basis (refer to "5.11.4 RRM function, trace function, and coverage function used on a mutually exclusive basis").
To switch between the three functions, go to the [Option] menu.

5.11.1 Coverage mesurement result display

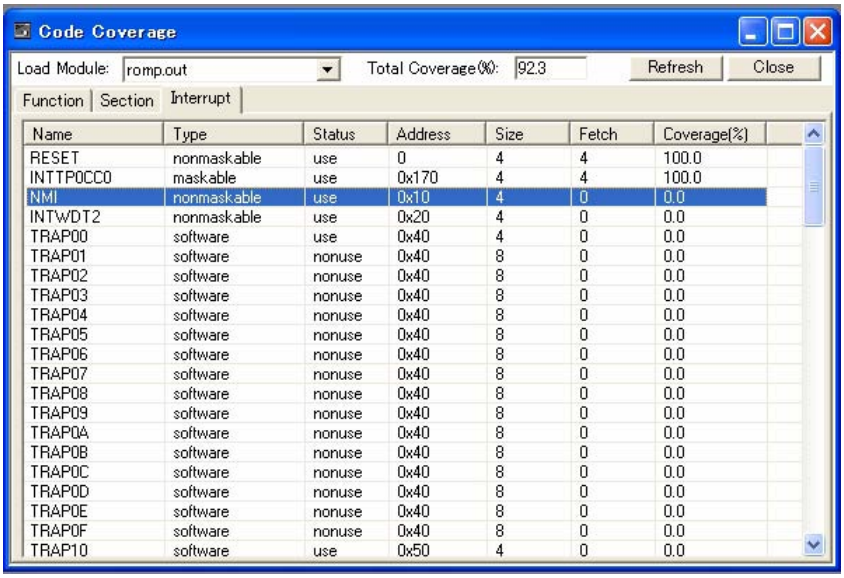
The coverage measurement result can be checked in the Code Coverage Window.

In the Code Coverage Window, the measurement result is displayed individually for functions, sections, and interrupt handlers (vectors). The coverage measurement result is updated at a break (it is not updated automatically during user program execution). Clear the coverage data by selecting [Option] menu. Coverage data can be saved in the CSV format. (Refer to "5.15.2 Window display information (view file)".)

The saved contents vary depending on the tab selected.

Clear the coverage data by selecting [Option] menu ->[Coverage] ->[Clear].

Figure 5-21 Coverage Mesurement Result Display



5.11.2 Coverage measurement range

The coverage measurement range is as follows.

Table 5-14 Code Coverage Measurement Range

Connected IE	Code Coverage Measurement Range
[IECUBE]	Internal ROM space + any 1 MB space (selectable by Coverage-Address Dialog Box)

5.11.3 Display of locations for which coverage measurement is executed

The locations for which coverage measurement is executed in the user program are displayed in the Source Window and Assemble Window based on the coverage measurement information.

The display result can be saved as view files for the Source Window and Assemble Window. (Refer to "5.15.2 Window display information (view file)".)

The numbers of line or addresses for which coverage measurement is executed are highlighted as shown in the table below. In the view file, the marks in the table below are appended to the relevant line number or address instead of using the background color.

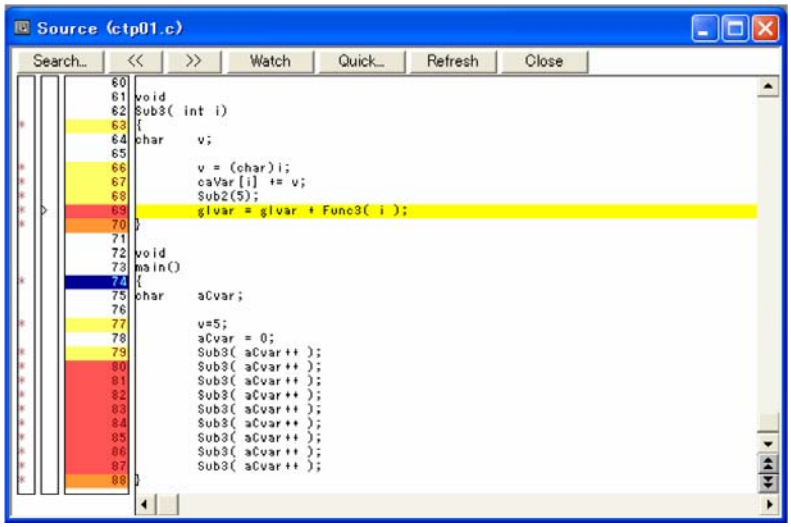
Table 5-15 Format of View of Locations for which Coverage Measurement is Executed

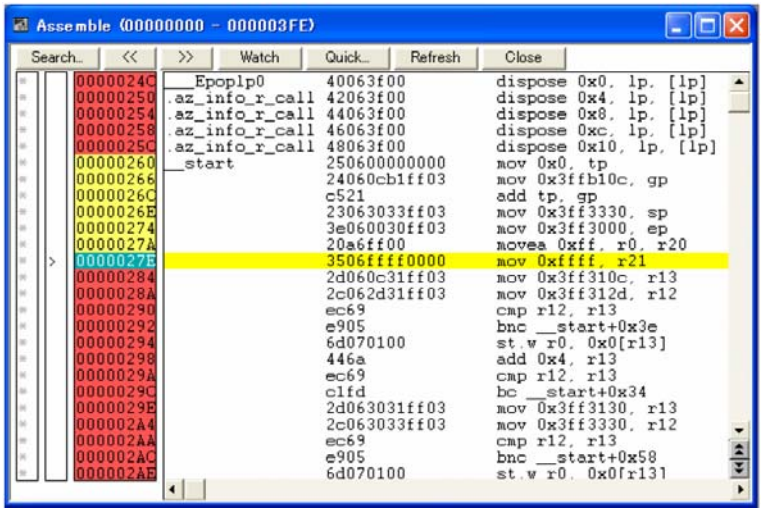
Coverage	Source Window		Assemble Window	
	Background Color	Mark	Background Color	Mark
Code on this line has been executed by 100%	Yellow	@	Yellow	@
Code on this line has been executed by 1 to 99%	Orange	+	---	
Code on this line has been executed by 0% (not yet executed)	Red	!	Red	!

Remark These are default colors.

They can be changed in the Coverage-Color Dialog Box.

Figure 5-22 View of Locations for which Coverage Measurement is Executed





5.11.4 RRM function, trace function, and coverage function used on a mutually exclusive basis

RRM Function, Trace Function [IECUBE] and Coverage Measurement Function [IECUBE] are functions that are used on a mutually exclusive basis.

Accordingly, the trace and coverage functions cannot be used when the RRM function is selected; the RRM and coverage functions cannot be used when the trace function is selected; and the RRM and trace functions cannot be used when the coverage function is selected.

To switch between the three functions, go to the [Opiton] menu, and select one of the [RRM Function/Trace Function/Coverage Function].

Basically, the three functions are used on a mutually exclusive basis; however the operations below are possible.

- The switching of the functions does not clear coverage data.
- Even when a function other than the coverage function is selected, coverage data can be downloaded, uploaded, and cleared.
- When the coverage function is selected, it is possible to perform traces, with the trace mode fixed at "All PC." (Conditional traces cannot be performed.)
- When the RRM function is selected, the trace data displayed in the Trace View Window indicates only branch information and access information in the sampling range of Real-time monitor function [IECUBE]. (Traces are performed, with the trace mode fixed at "Branch PC.")

5.12 Event Function

Events specify specific states of the target system during debugging, such as "fetched address 0x1000" or "Wrote data to address 0x2000".

In ID850QB, such events are used as action triggers for each debugging function, such as break and trace.

This section explains the following items:

- Using event function
- Creating events
- Setting event conditions
- Number of enabled events for each event condition
- Managing events
- Cautions [MINICUBE] [MINICUBE2]

5.12.1 Using event function

Events (event conditions and event rink conditions) consist of the event conditions listed in the following table, by assigning various debugging functions. As a result, event conditions can be utilized according to the debugging purpose.

Table 5-16 Various Event Conditions

Event Condition	Mark	Contents ->Setting Dialog Box
Break event	B	Condition in which the execution of the user program or operation of a tracer is stopped. (Refer to "5.4 Break Function".) ->Break Dialog Box
Trace event **[IECUBE]**	T	Condition in which the process of user program execution is saved to the trace memory. (Refer to "5.10 Trace Function [IECUBE]".) ->Trace Dialog Box
Timer event **[IECUBE]**	Ti	Condition for specifying the time measurement start timing and stop timing. (Refer to "5.9 Timer Function [IECUBE]".) ->Timer Dialog Box

5.12.2 Creating events

Events can be used as action triggers of various event conditions described before through registration of event conditions and event link conditions, individually naming states called events.

(1) Creating and registering events

The creation of event conditions is done in the Event Dialog Box.

Set an address condition, status condition, and data condition in this dialog box. Specify a combination of these as one event condition and name and register this event condition.

A simple method consists in using event conditions generated by setting breakpoint in the Source Window and Assemble Window. (Refer to "5.4.2 Breakpoint setting".)

(2) Creating and registering event links

Event link conditions are conditions for single events that provide ordered restrictions for event conditions, and are generated when user programs are executed according to the specified sequence.

To create an event link condition, use the Event Link Dialog Box.

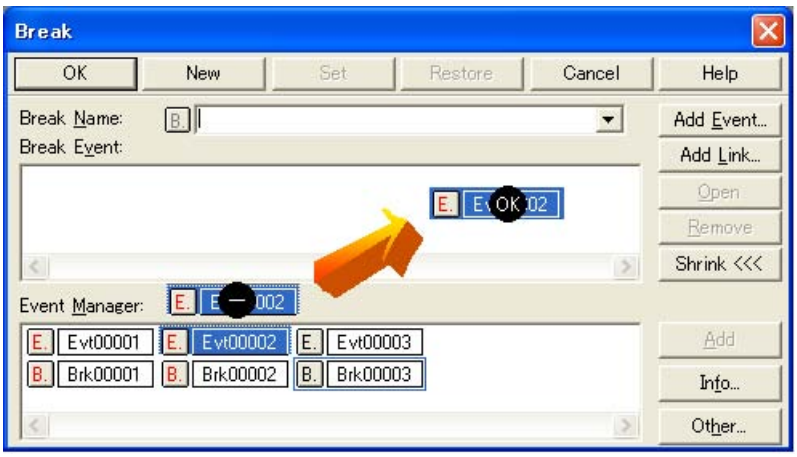
5.12.3 Setting event conditions

Various event conditions listed in Table 5-16 are individually created in the corresponding dialog box.

(1) Setting of Various Event Conditions

The setting of the various event conditions is done by selecting the event icon of the desired event condition or event link condition displayed in the event manager area (or Event Manager) in the respective setting dialog box, and dragging and dropping this icon in the condition area to be set.

Figure 5-23 Setting of Various Event Conditions



The shape of the mouse cursor changes to "OK" when it is dragged over a settable condition area.

Regarding the created event conditions, the event icon mark becomes red and the setting is enabled by clicking the <Set> button or the <OK> button in the Setting dialog box. After the event has been set, a debugging action occurs as various event conditions.

(2) Settings using selection mode (settings after checking contents)

The Event Dialog Box or Event Link Dialog Box are open in the selection mode by placing the focus on the condition area to be set and then clicking the <Add Event...> button or the <Add Link...> button. Because when a condition set in the dialog box is selected, the corresponding detailed condition is displayed, conditions can be set after checking the contents.

(3) Copying and moving event icons

In the event condition setting area, event conditions can be copied and moved through drag & drop operation using the following methods.

- If event condition was dropped using only the mouse, move event condition.
- If the event condition was dropped while pressing the Ctrl key, copy the event condition.

(4) Manipulation in event manager area

Event conditions can be set by clicking the <Add> button after placing the focus on the condition area to be set and selecting an event icon.

Event setting content display

Select an event and click the <Open> button or double-click the event. The setting dialog box corresponding to the selected event will be opened and the set contents of the event will be displayed.

Deletion

An event can be deleted by selecting the event and then clicking the <Remove / Delete> button or pressing the Delete key.

Changing display mode and sorting

The display mode of and sorting in the event manager area can be selected by clicking the <Info...> button.

Area non-display

An area can be hidden by clicking the <Shrink<<< > button.

5.12.4 Number of enabled events for each event condition

Up to 256 conditions can be registered as event conditions or various event conditions.

One event condition or link event condition can be set for multiple types of events such as break and trace.

However, the number of event conditions that can be simultaneously set (enabled) is limited as follows.

Therefore, if the valid number is exceeded or if the used event conditions or event link conditions exceed the maximum number that can be used simultaneously, it is necessary to disable the set various event conditions once and then register them again. (Refer to "5.12.5 Managing events".)

Table 5-17 Number of Enabled Events for Each Event Condition

Connected IE		Event		Event Link	Break	Trace	Timer
		Execution	Access				
[IECUBE]		10***a**	6***b**	1	10+6	1	7***g**
[MINICUBE]	Nx85ET（RCU0+TEU+TRCU）	10***a**	4***c**	1***d**	10+4	-	-
	Nx85E901（RCU0），RCU1	2***e**		1***f**	2***e**	-	-
[MINICUBE2]	With debug function	2***e**		1***f**	2***e**	-	-
	Without debug function	-		-	-	-	-

***a** 2 before executions (usable only for breaks, address range not specifiable), 8 post-execution events (4 when address range is specified, because 2 events are used for range specification)

***b** 3 when address range is specified, because 2 events are used for range specification

***c** 2 when address range is specified, because 2 events are used for range specification

***d** Use from Phase 1 to Phase 4

***e** Address range specification is not possible.

***f** Can be set only for Phase 1 and Phase 2

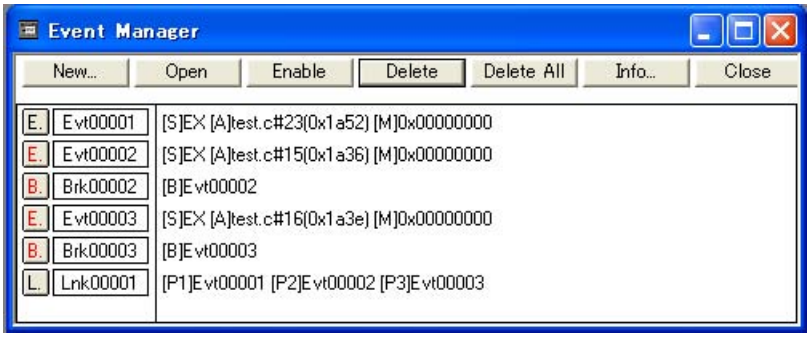
***g** Can not be set the event condition that range address is specified for Start Event or End Event area. Can be set the event link condition that range address is specified.

5.12.5 Managing events

Managing events is done with the Event Manager.

The Event Manager allows display, enabling/disabling, and deletion of the Various Event Conditions.

Figure 5-24 Managing Events (the Event Manager)



(1) Event icon

Event icons consist of a mark and an event name indicating the type of event. The color of each event icon indicates the setting status of that event.

Enable/disable is switched by clicking the mark part.

Table 5-18 Event Icon

Character Color	Mark	Meaning
Red	E.L.	Indicates that the event condition or event link condition which is used for various event conditions is enabled.
	B.T.Ti.	Indicates that the Various Event Conditions is valid. The various events occur when its condition is satisfied.
Black	E.L.	Indicates that the event condition or event link condition which is used for various event conditions is disabled.
	B.T.Ti.	Indicates that the Various Event Conditions is invalid. The various events do not occur even when its condition is satisfied.
Yellow	E.L.	Indicates that the symbol specified for an event is held pending because it cannot be recognized by the program currently loaded.
	B.T.Ti.	Indicates that the Various Event Conditions is held pending. The various events do not occur even when its condition is satisfied.

5.12.6 Cautions [MINICUBE] [MINICUBE2]

(1) Restrictions on event detection using bit manipulation instruction

- When the access size of an event is set to Byte and the event is set at an address other than a multiple of 4, if the address is accessed by a bit manipulation instruction, an incorrect event may be detected or no event may be detected.
- When the access size of an event is set to Bit and the event is set at an address other than a multiple of 4, if the address is accessed by a bit manipulation instruction, an incorrect event may be detected or no event may be detected.

(2) Restrictions exist in event detection during a misalign access.

- Restriction on write access event: No events can be detected in a misalign access.
- Restriction on read access event: Events can be detected in a misalign access by setting the read access event as shown below.

Access Address	Access Size in Program	Access Size Specified with Event Condition
(Multiple of 4) + 0	Word	Word
(Multiple of 4)+1		Byte
(Multiple of 4)+2		Half Word
(Multiple of 4)+3		Byte
(Multiple of 4)+0	Half Word	Half Word
(Multiple of 4)+1		Byte
(Multiple of 4)+2		Half Word
(Multiple of 4)+3		Byte

When the memory contents and a program shown below exist, describe the event conditions as shown below to generate the access event.

[Memory contents]

```
          +0  +1  +2  +3
3FF8000  11  22  33  44
```

[Program]

```
00FFE    nop
01000    mov  0x3FF8001, gp
01006    nop
01008    ld.w  0x0[gp], r6
```

[Event condition]

```
Event Name   :Evt0001(any)
Event Status   :R
Access Size   :Byte
Address        :0x3FF8001
Data           :0x22
```

(3) Events may not be detected with the event link function. The conditions differ for execution events and access events.

Execution events

If the address of an execution event satisfies the conditions shown below, the second event cannot be detected normally. This condition does not apply when the event at the second address is executed again using a branch, etc.

- The interval between the first and second instruction is within 4 bytes (internal ROM, internal RAM)
- The first and second instruction are executed consecutively (target)

A detailed example for a program and the event setting is shown below. If events are set as shown in the example, events with the event link function do not occur because the second execution event cannot be detected.

[Example when events are set to program in target system]

```
00FFFFE   nop
0100000   nop   <---1st execution event
0100002   nop   <---2nd execution event
0100004   nop
```

Access events

If the address of an access event satisfies the conditions shown below, the second event cannot be detected normally. This condition does not apply when the event at the second address is executed again using a branch, etc.

- The interval between the first and second instruction is within 4 bytes (accessing the internal ROM or internal RAM)
- The interval between the first and second instruction is within 28 bytes (target)

A detailed example for a program and the event setting is shown below. If events are set as shown in the example, events with the event link function do not occur because the second access event cannot be detected.

[Example when events are set to program in internal ROM]

```
0100   mov   0x1000, gp
0106   ld.b  0x10[gp], r6   <----- 1st access event
010a   nop
010c   ld.b  0x12[gp], r7   <----- 2nd access event
0110   nop
```

5.13 RRM Function

This section explains the following items related to the RRM function.

- Real-time monitor function [IECUBE]
- Pseudo real-time monitor function (Break When Readout)

5.13.1 Real-time monitor function [IECUBE]

Table 5-19 shows the range of data that can be loaded using the real-time monitor function.

The variables and data allocated to this area can be displayed always in real time in the Watch Window and Memory Window.

The sampling interval can be specified in the Extended Option Dialog Box.

Table 5-19 Areas for Which Sampling Can Be Performed with Real-Time Monitor Function

Connected IE	Sampling Range
[IECUBE]	Areas specified in the RRM Setting Dialog Box

Figure 5-25 RRM Setting Dialog Box

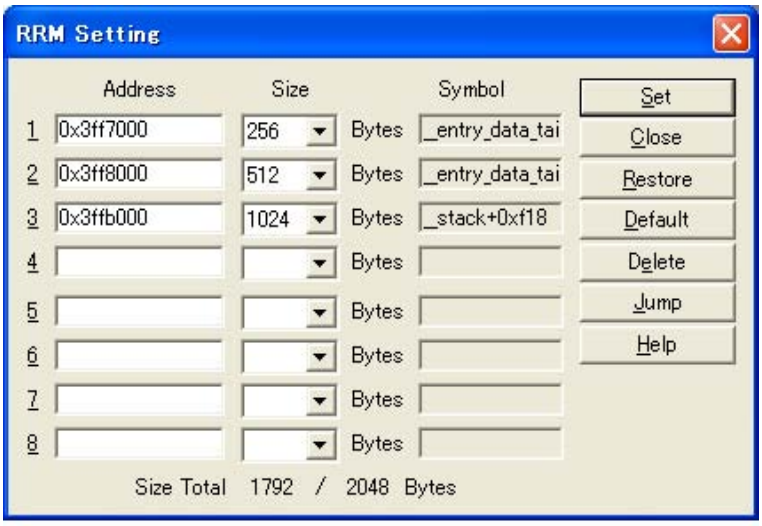
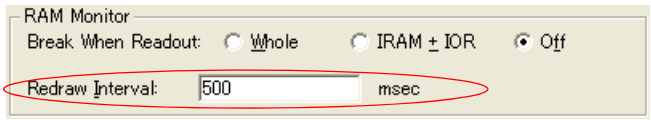


Figure 5-26 Specification of Interval for Sampling with Real-Time Monitor Function



Caution1: RRM Function, Trace Function [IECUBE] and Coverage Measurement Function [IECUBE] are functions that are used on a mutually exclusive basis. (Refer to "5.11.4 RRM function, trace function, and coverage function used on a mutually exclusive basis".)
To switch between the three functions, go to the [Option] menu. **[IECUBE]**

Caution2: Data that is overwritten with the DMM function during RUN and overwritten via DMA is not reflected in the real-time RAM monitor area. In addition, output of the access monitor function is not displayed in color. **[IECUBE]**

Caution3: The RRM function reads data bit-wise as hardware, illegal values may be displayed for variables of two or more bytes in the Watch Window. **[IECUBE]**

5.13.2 Pseudo real-time monitor function (Break When Readout)

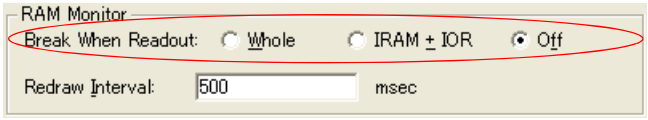
To read areas that cannot be read using the real-time monitor function, the pseudo real-time monitor function can be used instead.

The memory area is read by software simulation while the pseudo real-time monitor function is executed, so execution of the user program momentarily breaks upon a read.

The variables and data allocated to this area can be displayed in close to real-time in the Watch Window and Memory Window.

Specify turning on/off of the pseudo real-time monitor function and the sampling range in the Extended Option Dialog Box.

Figure 5-27 Specification of Pseudo Real-Time Monitor Function



Caution: The pseudo real-time monitor function and software break function are exclusive of each other.
When the pseudo real-time monitor function is enabled (item other than "Off" is selected), no software break points can be set. All the valid software break points that have been set are also made invalid.

5.14 DMM Function

DMM (Dynamic Memory Modification) is a function that rewrites the contents of the memory (RAM) in real-time during user program execution.

The DMM Dialog Box is opened by clicking the <DMM... > button on the Memory Window, Register Window, or IOR Window. Specify the DMM target address and data.

Caution1: Since this function is implemented by software simulation, user program execution stops momentarily when rewriting to the memory (pseudo DMM function).

Caution2: The DMM function and software break function are exclusive of each other.
When a valid software break point has been set, writing (DMM) during user program execution is disabled (if attempted, an error results).

Figure 5-28 Modifying Memory Contents (DMM Dialog Box)

5.15 Load/Save Function

ID850QB allows saving and loading the following types of information as files. As a result, recovery of these various types of information is possible.

- Debugging environment (project file)
- Window display information (view file)
- Window setting information (setting file)

Remark: The simple window status can be maintained by selecting [Window] menu -> [Static]. (Refer to "5.16.1 Active status and static status".)

5.15.1 Debugging environment (project file)

A project file (*.prj) is a file that records the debugging environment.

A project file is created when the debugging environment at a particular point in time is saved, and that debugging environment can be restored by loading this file at a subsequent time.

Project files are loaded and saved in the Project File Save Dialog Box and Project File Load Dialog Box, respectively. To load a project file at startup, press the <Project...> button in the Configuration Dialog Box.

The following contents are saved to the project file:

Table 5-20 Contents Saved to Project File

Window Name	Saved Contents
Configuration Dialog Box	All items (target device, clock setting, pin mask setting, mapping information)
Main Window	Display position, tool bar/status bar/button display information, execution mode information
Download Dialog Box	File information to be downloaded
Extended Option Dialog Box Debugger Option Dialog Box Fail-safe Break Dialog Box Flash Option Dialog Box Data Flash Option Dialog Box RRM Setting Dialog Box	Set information
Assemble Window Memory Window	Display information of window, display start address
Source Window Stack Window IOR Window Local Variable Window Trace View Window Code Coverage Window Event Manager Console Window Expansion Window Register Window	Display information of window

Window Name	Saved Contents
Event Dialog Box Event Link Dialog Box Break Dialog Box Trace Dialog Box Timer Dialog Box	Display information of window, event information
List Window	Display position of window
Watch Window	Display information of window[Note], watch registration information
Add I/O Port Dialog Box	Added I/O port information
DMM Dialog Box	DMM information
Delay Count Dialog Box	Delay count value
Software Break Manager	Display information of window, software break information

Note: The display status of members of a structure pointer, array pointer and so on, and radix for displaying individual member are not saved.

5.15.2 Window display information (view file)

A view file is a file that records window display information.

View files can be loaded and saved for each window.

When a view file is loaded, a reference window (Source Window in the static status) is displayed and the display information at the time of saving is displayed.

View files are loaded and saved in the View File Load Dialog Box and View File Save Dialog Box, respectively.

Table 5-21 Type of View Files

File Type	Current Window Name, File Name
Source Text (*.svw)	Source Window[Note1]
Assemble (*.dis)	Assemble Window[Note1]
Memory (*.mem)	Memory Window
Watch (*.wch)	Watch Window
Register (*.rgw)	Register Window
I/O Register (*.ior)	IOR Window
Local Variable (*.loc)	Local Variable Window
Stack Trace (*.stk)	Stack Window
Trace (*.tvw)	Trace View Window
Code Coverage (*.csv)	Code Coverage Window (Data is saved separately for the tab selected)
List (*.csv)	List Window (Data is saved separately for the tab selected)

File Type	Current Window Name, File Name
Console (*.log)	Console Window
All (*.*)	All files
Source (*.c, *.s)	Source file**Note2**
Text (*.txt)	Text file

Note1: The mark for indicating the code coverage measurement result (executed/not yet executed) is added to the contents of the displayed file. (Refer to "Table 5-15 Format of View of Locations for which Coverage Measurement is Executed".) **[IECUBE]**

Note2: The extension of the source file can be changed in the Extended Option Dialog Box.

5.15.3 Window setting information (setting file)

A setting file is a file that records the window setting information (watch data settings, peripheral I/O registers settings, and event settings).

Setting files can be loaded and saved for each window.

When a setting file is loaded, the target window is displayed and the setting information that was saved is restored.

Setting files are loaded and saved in the Environment Setting File Load Dialog Box and Environment Setting File Save Dialog Box, respectively.

Table 5-22 Type of Setting Files

File Type	Current Window Name
Watch (*.wch)**Note**	Watch Window
I/O Register (*.ior)**Note**	IOR Window
Event (*.evn)	Event Manager

Note: A variable value can not be loaded.

5.16 Functions Common to Each Window

The windows have the following common functions.

- Functions Common to Each Window
- Jump function
- Trace result with linking window [IECUBE]
- Drag & drop function
- Cautions

5.16.1 Active status and static status

Each of the Windows below has two statuses: The Active status and Static status.

- Source Window (that is displaying the source file to which symbol information is read)
- Assemble Window
- Memory Window

Only one window can be opened in the active status. However, because two or more windows in the static status can be opened, the current status of the windows can be temporarily held.

Select this status by the [Window] menu.

(1) Active status

The display position and contents of the window in the active status are automatically updated in association with the current PC value.

This window is also the jump destination of the Jump function. If this window is linked with the Trace View Window, the contents displayed in the active window are updated in association with the Trace View Window.

Only one window can be opened in the active status.

(2) Static status

The display position of the window in the static status does not move in association with the current PC value, but the displayed contents are updated.

The static window is not used as the jump destination of the Jump function. In addition, it is not linked with the Trace View Window.

If an active window is already open, the next window is opened in the static status.

Two or more static windows can be opened at the same time.

5.16.2 Jump function

This is a function that jumps to any of the Windows below from a line or address (a jump pointer) on which the cursor is put. The Window to which the jump is made is displayed on the jump pointer.

- Source Window
- Assemble Window
- Memory Window

You can jump among the above windows, or from the Trace View Window, Stack Window, Event Manager and Register Window to the above windows.

(1) Jump method

The jump method is as follows:

1) Move the cursor to the line or address that is to be used as the jump pointer, on the window from which jumping is possible (select an event icon on the Event Manager).
2) Select the following menu item to which execution is to jump from the [Jump] menu.

Caution: If a program code does not exist on the line at the cursor position, the first address of the line with a program code above or below that line is used as the jump pointer.

(2) Details of jump source address

The details of jump source address is as follows:

Table 5-23 Details of Jump Source Address

Target Window	Details of Jump Pointer	
From the Register Window	Registers selected	
From the Memory Window	Address at the cursor position	
From the Event Manager	If the selected event icon is that of an event condition, an address condition is used as the jump pointer.	
	If the address condition is set in point	Jump to specified address
	If the address condition is set in range	Jump to lower address (point address before the mask if a mask is specified)
	If the address condition is set in bit	Jump to address at the bit position

Target Window	Details of Jump Pointer	
From the Stack Window	A function at the cursor position that stack flame number indicates is used as the jump pointer.	
	With current function	
	If the jump destination is the Source Window	Jumps to the current PC line
	Other than above	Jumps to the current PC address
	With function other than current function	
	If the jump destination is the Source Window	Jump to the line that calls a nested function.
	Other than above	Jump to the address next to the instruction that calls a nested function.
From the Trace View Window	Jump to the Memory Window	
	If the cursor position is at an access address, access data, or access status	Access address
	Other than above	Fetch address
Jump to the Source Window or Assemble Window	Fetch address	

5.16.3 Trace result with linking window [IECUBE]

By linking the Trace View Window with each window (Source Window, Assemble Window or Memory Window), the corresponding part can be displayed on the linked window, by using the address at the cursor position on the Trace View Window as a pointer.

If the cursor is moved on the Trace View Window, the corresponding part on the linked window is highlighted or indicated by the cursor position.

(1) Linking method

The linking method is as follows:

1) Set the Trace View Window as the current window.
2) Select [View] menu -> [Window Synchronize] to select a window to be linked.
3) Move the cursor to the line to be linked in the trace result display area of the Trace View Window.
4) Using the address of the line selected in 3) as a pointer, the corresponding part is highlighted (or indicated by the cursor position) in the display area of the window selected in 2).

Remark: The linking source address differs as follows depending on the cursor position in the trace result display area if the Memory Window is linked.
- Access address, access data, access status -> Access address
- Others -> Fetch address

When the Source Window or Assemble Window is linked, the fetch address is always used as the pointer.

5.16.4 Drag & drop function

Selected and highlighted line numbers, addresses, and text can be dragged and dropped in another window using the following method.

1) Drag the selected line number, address, or text.
   -> The shape of the mouse cursor changes from an arrow to "-".
2) Drop the selection in a window or area where it can be dropped.
   -> The shape of the cursor changes from "-" to "OK" when the cursor is placed over a window or area where the selection can be dropped.

In the window in which the line number of the address has been dropped, an operation is performed on the dropped address or the address that is obtained from the dropped line number. For example, a variable can be simply registered by dragging and dropping in the Watch Window such a variable located in the Source Window.

(1) Drag & drop details

The operation to be performed after dropping the line number or address differs, depending on the window or area in which the line number or address has been dropped.

Table 5-24 Details of Drag & Drop Function (Line/Address)

Window/Area to Drop to	Operation After Drop
The Event Manager or the event manager area in each various event setting dialog box	Automatically creates an execution event condition by using the dropped line number or address as an address condition. Event condition names are automatically created as Evt00001, Evt00002, and so on. A path count is not specified. The address condition is set for the closest symbol in the format of symbol name + offset value.
Condition setting area in each various event setting dialog box (other than address and data setting areas)	Automatically creates an execution event condition by using the dropped line number or address as an address condition. The automatically created event condition is set in each condition setting area in which the line number or address has been dropped. Event condition names are automatically created as Evt00001, Evt00002, and so on. A path count is not specified. The address condition is set for the closest symbol in the format of symbol name + offset value.
Condition setting area in each various event setting dialog box (address and data setting areas)	The text of the dropped line number or address is set in the area in which the line number or address has been dropped. The address condition is set for the closest symbol in the format of symbol name + offset value.

Table 5-25 Details of Drag & Drop Function (Character String)

Window/Area to Drop to	Operation After Drop	
The Event Manager or the event manager area in each various event setting dialog box	If the dropped text can be converted as a symbol into an address value, an event condition in the R/W status or Execute status is automatically created, using the converted address value as an address condition. Event condition names are automatically created as Evt00001, Evt00002, and so on. A data condition and path count are not specified. The address condition is set by the dropped text. The relationship between the event condition to be created and the symbol is as follows:	
	Symbols	**Status**
	Variable	R/W
	Function	Execute
	Symbol in data section	R/W
	Symbol in code section	Execute
	Others	R/W

<table>
<tr><th>Window/Area to Drop to</th><th>Operation After Drop</th></tr>
<tr><td>Condition setting area in each various event setting dialog box (other than address and data setting areas)</td><td>If the dropped text can be converted as a symbol into an address value, an event condition in the R/W status or Execute status is automatically created, using the converted address value as an address condition.
The automatically created event condition is set in each condition setting area in which the line number or address has been dropped.
Event condition names are automatically created as Evt00001, Evt00002, and so on. A data condition and path count are not specified.
The address condition is set by the dropped text.
The relationship between the event condition to be created and the symbol is as follows:
<table><tr><th>Symbols</th><th>Status</th></tr><tr><td>Variable</td><td>R/W</td></tr><tr><td>Function</td><td>Execute</td></tr><tr><td>Symbol in data section</td><td>R/W</td></tr><tr><td>Symbol in code section</td><td>Execute</td></tr><tr><td>Others</td><td>R/W</td></tr></table></td></tr>
<tr><td>Condition setting area in each various event setting dialog box (address and data setting areas)</td><td>The dropped text is set in the area.</td></tr>
<tr><td>Watch Window</td><td>If the dropped text is recognizable as a symbol, the contents of the symbol are displayed.</td></tr>
</table>

Remark: Each various event setting dialog box are as follows.

- Event Dialog Box
- Event Link Dialog Box
- Break Dialog Box
- Trace Dialog Box
- Timer Dialog Box

5.16.5 Cautions

(1) If the width of the display area is narrow, the display may become corrupted. In this case, increase the width of the window.

(2) Redrawing may not successfully be performed in a window with a <Refresh> button when the cursor position is changed while the window is active. Click the <Refresh> button to perform redrawing.

(3) The help that is opened using the F1 key is the help corresponding to the window on which the cursor is placed. Consequently, because the cursor cannot be placed on the Trace View Window in which no trace results are displayed, such as immediately after startup, the help may not open even if the F1 key is pressed. In this case, open the help by selecting [Current Window Help] from the [Help] menu.

(4) Do not select [Slowmotion] from the [Run] menu during Go & Go execution. [Slowmotion] on the [Run] menu is usually dimmed during Go & Go execution, but there is a moment when it can be selected, so if [Slowmotion] is selected at this time, the program will not be able to be stopped even if [Stop] is selected from the [Run] menu (or the STOP button is clicked).

(5) If for some reason or other the application switches while event icons are in the process of being dragged, the icons will no longer be able to be dropped.
Use the ESC key to escape from drag, then reattempt the drag.

(6) The 400th character and those that follow cannot be displayed if one line in a window contains more than 400 characters (ANK characters).

(7) Arrays with five dimensions or more are not supported.

(8) The Search menu of each window is dimmed during program execution.

(9) Big endian is not supported.

CHAPTER 6 WINDOW REFERENCE

This chapter explains in detail the functions of the windows and dialog boxes of ID850QB.

- Window List
- Explanation of Windows

6.1 Window List

The list is the windows of the ID850QB.

Table 6-1 Window List

Window Name	Contents
Main Window	This window is displayed first, when the ID850QB is started. It controls execution of the user program. Various windows are opened from this window.
Configuration Dialog Box	Displays and sets the ID850QB operation environment.
Extended Option Dialog Box	Displays and sets the extended options of the ID850QB.
Fail-safe Break Dialog Box	Sets the fail-safe breaks.
RRM Setting Dialog Box	Sets the RRM sampling range.
Flash Option Dialog Box	Sets the flash self programming emulation. **[IECUBE]**
Data Flash Option Dialog Box	Sets the data flash error emulation. **[IECUBE]**
Debugger Option Dialog Box	Displays and sets other options.
Project File Save Dialog Box	Saves the current debug environment to project file.
Project File Load Dialog Box	Loads the debug environment.
Download Dialog Box	Downloads.
Upload Dialog Box	Uploads.
Load Module List Dialog Box	Lists the names of the downloaded load module files.
Source Window	Displays a source file and text file.
Source Search Dialog Box	Searches in the Source Window.
Source Text Move Dialog Box	Specifies a file to be displayed in the Source Window and the position from which displaying the file is to be started.
Assemble Window	Disassembles the program and executes line assembly.
Assemble Search Dialog Box	Searches in the Assemble Window.
Address Move Dialog Box	Specifies the start address to display the contents of the Memory Window, Assemble Window or IOR Window.

Window Name	Contents
Symbol To Address Dialog Box	Displays the address of the specified variable or function, or the value of the specified symbol.
List Window	Lists functions, variables, symbols, sections, and interrupt requests.
Watch Window	Displays and changes specified watch data.
Quick Watch Dialog Box	Displays temporarily specified watch data.
Add Watch Dialog Box	Registers watch data todisplay in the Watch Window.
Change Watch Dialog Box	Changes watch data todisplay in the Watch Window.
Local Variable Window	Displays and changes the local variable in the current function.
Stack Window	Displays the current stack contents.
Memory Window	Display the contents of memory.
Memory Search Dialog Box	Searches in the Memory Window.
Memory Fill Dialog Box	Fills the memory contents with specified data.
Memory Copy Dialog Box	Copies the memory.
Memory Compare Dialog Box	Compares the memory.
Memory Compare Result Dialog Box	Displays the results of comparing the memory.
DMM Dialog Box	Sets addresses and data subject to DMM.
Register Window	Displays the contents of registers.
Register Select Dialog Box	Selects registers to be displayed in the Register Window.
IOR Window	Displays the contents of IOR.
IOR Select Dialog Box	Selects peripheral I/O registers and I/O ports to be displayed in the IOR Window.
Add I/O Port Dialog Box	Registers an I/O port to be displayed in the IOR Window.
Timer Dialog Box	Registers and sets timer event conditions, and displays execution time measurement result. **[IECUBE]**
Timer Result Dialog Box	Displays execution time measurement results. **[IECUBE]**
Trace View Window	Displays trace results. **[IECUBE]**
Trace Search Dialog Box	Searches trace data. **[IECUBE]**
Trace Data Select Dialog Box	Selects items to be displayed in the Trace View Window. **[IECUBE]**
Trace Move Dialog Box	Specifies the start address to display the contents of the Trace View Window. **[IECUBE]**
Trace Dialog Box	Registers and sets trace event conditions. **[IECUBE]**
Delay Count Dialog Box	Sets the delay count of a delay trigger trace event. **[IECUBE]**
Code Coverage Window	Display of code coverage results. **[IECUBE]**
Coverage-Address Dialog Box	Selects the code coverage measurement range. **[IECUBE]**

Window Name	Contents
Coverage-Color Dialog Box	Selects color to distinguish the coverage of executed code. **[IECUBE]**
Software Break Manager	Display, enable or disable, and delete software breaks.
Event Manager	Displays, enables/disables, and deletes each event condition.
Event Dialog Box	Registers event conditions.
Event Link Dialog Box	Registers event link conditions.
Break Dialog Box	Registers and sets break event conditions.
View File Save Dialog Box	Saves the display information of the current window to a view file.
View File Load Dialog Box	Loads the view file of each window.
Environment Setting File Save Dialog Box	Saves the setting information of the current window to a setting file.
Environment Setting File Load Dialog Box	Loads the setting file of each window.
Reset Debugger Dialog Box	Initializes the ID850QB,CPU, and symbol information.
Exit Debugger Dialog Box	Terminate the ID850QB.
About Dialog Box	Displays the version of the ID850QB.
Console Window	Inputs commands.
Browse Dialog Box	Selects the file to be set.

6.2 Explanation of Windows

This section explains each window or dialog box as follows:

Window Name / Dialog Box Name

Briefly explains the function of the window or dialog box and points to be noted.

If an invalid window/dialog box exists due to a connected IE, the name of the valid connected IE is indicated at the lower right of the window/dialog box name.

In addition, the display image of the window or dialog box is also illustrated.

Items of related operation are also explained.

Opening

Explains how to open the window or dialog box.

Explanation of Each Area

Explains items to be set to or displayed in each area of the window or dialog box.

Context Menu

Explains the context menu that is displayed in the window when the right mouse button is clicked. From the context menu, convenient functions often used in this window can be selected with a single action (window only).

Related operations

Explains the operation of a window or dialog box related to this window or dialog box.

Main Window

This window is automatically opened when the ID850QB is started up and initialized.

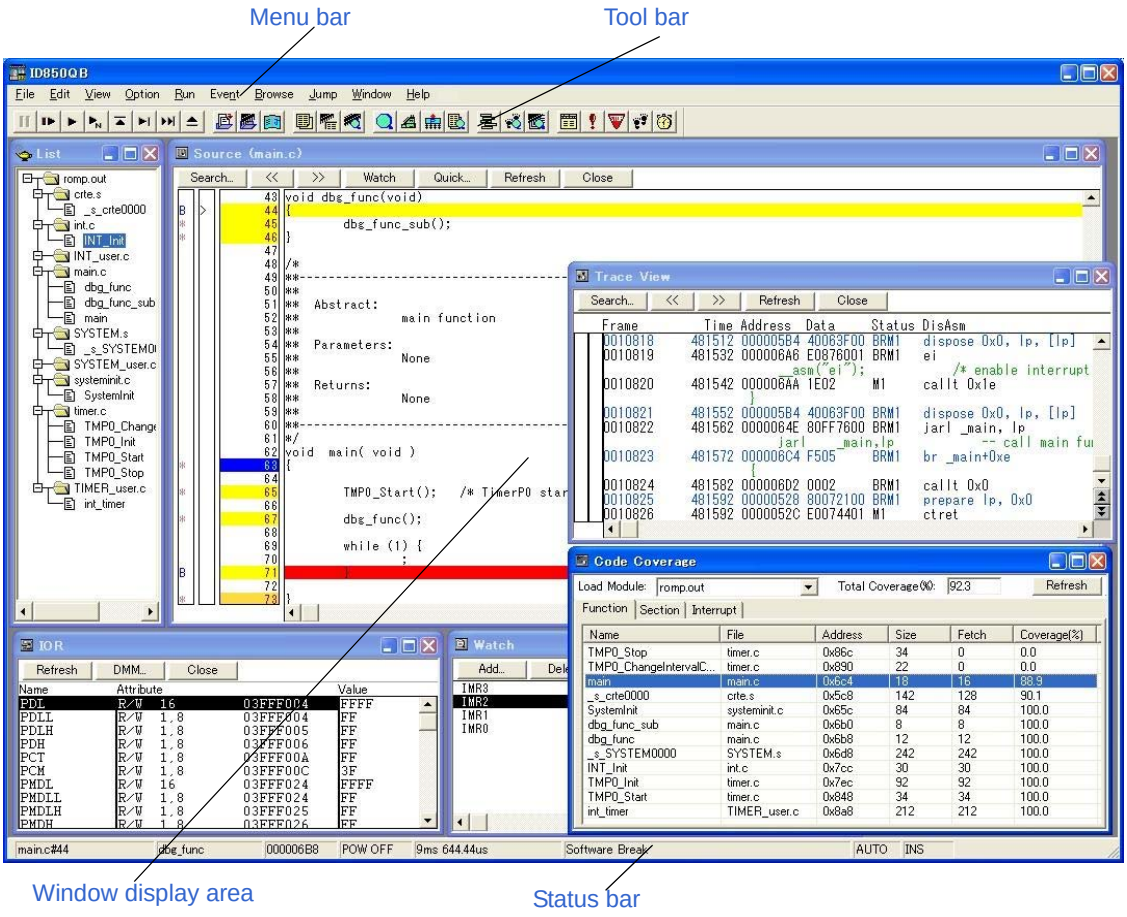
In the ID850QB, other windows are manipulated from this window. (Refer to "6.1 Window List".).

Execution of the user program is controlled in this window.

Execution of the user program is controlled in the following three modes:

- Source mode (Debugs the user program at the source level.)
- Instruction mode (Debugs the user program at the instruction level.)
- Auto mode (Automatically selects the source mode or instruction mode.) (default)

Figure 6-1 Main Window



Menu bar

(1) [File] menu

Open...	Loads a view file, source file, or text file. Opens the View File Load Dialog Box. The operation differs depending on the extension of the file selected in the dialog box.
Save As...	Saves the contents displayed on the current window to the file whose name is specified. Opens the View File Save Dialog Box.
Close	Closes the current window.
Download...	Downloads a file. Opens the Download Dialog Box.
Load Module...	Lists the names of the files that have been downloaded. Opens the Load Module List Dialog Box.
Upload...	Uploads a program. Opens the Upload Dialog Box.
Project	Manipulates a project file.
Open...	Opens a project file. Opens the Project File Load Dialog Box.
Save	Overwrites the current status to the project file currently being read to the ID850QB.
Save As...	Saves the current status to a specified project file. Opens the Project File Save Dialog Box.
Environment	Manipulates a setting file.
Open...	Opens a setting file. Opens the Environment Setting File Load Dialog Box.
Save As...	Saves the setting in the current window to the setting file. Opens the Environment Setting File Save Dialog Box.
Debugger Reset...	Initializes the CPU, symbols, and ID850QB. Opens the Reset Debugger Dialog Box.
Exit	Terminate the ID850QB. (Refer to "3.5 Terminating".) Opens the Exit Debugger Dialog Box.
(Open file)	Lists the names of the files opened.

(2) [Edit] menu

Cut	Cuts a selected character string and saves it to the clipboard buffer.
Copy	Copies a selected character string and saves it to the clipboard buffer.
Paste	Pastes the contents of the clipboard buffer to the text cursor position.
Write in	Writes the modified contents to the target.
Restore	Cancels the modification.
Memory	Manipulates the memory contents.
Fill...	Fills the memory contents with specified codes. Opens the Memory Fill Dialog Box.
Copy...	Copies the memory. Opens the Memory Copy Dialog Box.
Compare...	Compares the memory. Opens the Memory Compare Dialog Box.
DMM...	Rewrites the memory contents in real time during user program execution.Opens the DMM Dialog Box.
Edit Source	Opens the source file displayed in the active Source Window with the editor specified by the PM+ when the PM+ runs.

(3) [View] menu

The [View] menu contains common parts as well as dedicated parts added according to the active window. For details about the dedicated parts, refer to the description of each window.

(a) Common items

Search...	Performs a search. Opens the search dialog box corresponding to the current window. Same operation as the <Search> button.
Move...	Moves the display position. Opens the specification dialog box corresponding to the current window.
Quick Watch...	Temporarily displays the contents of the specified data. Opens the Quick Watch Dialog Box.
Add Watch...	Registers the specified data to the Watch window. Opens the Add Watch Dialog Box.
View Watch	Adds the selected data to the Watch window. If the data is a symbol, it is added in accordance with the setting of the Debugger Option Dialog Box.
Change Watch...	Changes the data on the line selected by the Watch window. Opens the Change Watch Dialog Box. This menu is valid only when a variable is selected in Watch Window.
Delete Watch	Deletes the selected watch point from the Watch Window. This menu is valid only when a variable is selected in Watch Window.
Symbol...	Displays the address of the specified variable or function, or the value of the specified symbol. Opens the Symbol To Address Dialog Box.

(4) [Option] menu

Tool Bar	Switches whether to display the tool bar.
Status Bar	Switch whether to display the tool bar.
Button	Switch whether to display the buttons on each window.
Source Mode	Executes step execution at the source level (in line units).
Instruction Mode	Executes step execution at the instruction level (in instruction units).
Auto Mode	Automatically selects step execution at the source level or step execution at the instruction level (default). Step execution is performed at the source level (in a mode other than mixed display mode) if Source Window is active. It is performed at the instruction level if Assemble Window is active. If neither window is active, step execution is performed at the source level.
Configuration...	Sets the environment. Opens the Configuration Dialog Box.
Extended Option...	Sets extended options. Opens the Extended Option Dialog Box.
RRM Setting... **[IECUBE]**	Sets the sampling range for RRM function. Opens the RRM Setting Dialog Box.
Flash Option... **[IECUBE]**	This dialog box is used to make the flash self programming emulation settings. Opens the Flash Option Dialog Box.
Data Flash Option... **[IECUBE]**	This dialog box is used to make the data flash error emulation settings. Opens the Data Flash Option Dialog Box.
Debugger Option...	Sets ID850QB options. Opens the Debugger Option Dialog Box.
Add I/O Port...	Adds user-defined I/O ports. Opens the Add I/O Port Dialog Box.
Trace Clear **[IECUBE]**	Clears the trace data. This item is displayed only when Trace View Window is active.
Coverage **[IECUBE]**	Opens the following dialog boxes related to coverage measurement.
Clear **[IECUBE]**	Clears the coverage measurement results.
Select... **[IECUBE]**	Selects the coverage measurement range as a space of 1 MB or more. Opens the Coverage-Address Dialog Box.
RRM Function **[IECUBE]**	Select the RRM function. (Refer to "5.13 RRM Function".)(default) This function is used on a mutually exclusive basis with the Trace function and coverage function. (Refer to "5.11.4 RRM function, trace function, and coverage function used on a mutually exclusive basis".) When this is selected, the following menu cannot be selected. [Trace start/Trace end], [Uncond. Trace ON/Cond.Trace ON], [Tracer Control Mode]
Trace Function **[IECUBE]**	Trace function is selected. (Refer to "5.10 Trace Function [IECUBE]".) This function is used on a mutually exclusive basis with the RRM function and coverage function. (Refer to "5.11.4 RRM function, trace function, and coverage function used on a mutually exclusive basis".) When this is selected, the following menu cannot be selected. [RRM Setting...]

Coverage function **[IECUBE]**	Coverage function is selected. (Refer to "5.11 Coverage Measurement Function [IECUBE]".) This function is used on a mutually exclusive basis with the RRM function and trace function. (Refer to "5.11.4 RRM function, trace function, and coverage function used on a mutually exclusive basis".) This function is disabled when no coverage boards are incorporated. When this is selected, the following menu cannot be selected. [Trace start/Trace end], [Uncond. Trace ON/Cond.Trace ON], [Tracer Control Mode], [RRM Setting...]

(5) [Run] menu

Restart	Resets the CPU and executes the program.  Same operation as this button.
Stop	Forcibly stops program execution.  Same operation as this button.
Go	Executes the program from the current PC.  Same operation as this button.
Ignore break points and Go	Ignores break points being set, and executes the program. (Both hard and soft.)  Same operation as this button.
Return Out	The user program is executed until execution returns  Same operation as this button. **Note:** This command is used for a function described in C language.
Step In	Executes the instructions in the program one by one (step execution). If a function or subroutine is called, its instructions are executed one by one.  Same operation as this button.
Next Over	Executes the instructions in the program one by one (Next step execution). If a function or subroutine is called, its instructions are not executed on a step-by-step basis.  Same operation as this button.
Start From Here	Executes the program from the cursor position on Source Window or Assemble Window.
Come Here	Executes the program from the current PC to the cursor position in the Source Window or the Assemble Window.
Go & Go	Continues executing the program. If a break occurs because a break condition is satisfied, the window is updated and the program is executed again.  Same operation as clicking this button each time a break has occurred.
Slowmotion	Continues step execution. Each time step execution has been performed, the window is updated and then step execution is performed again.  Same operation as clicking this button each time a break has occurred.
CPU Reset	Resets the CPU.  Same operation as this button.

Change PC	Sets the address at the cursor position in the Source Window or Assemble Window to the PC.
Break Point	Sets or deletes a breakpoint at the cursor position in the Source Window or Assemble Window.
Software Break Point	Sets or deletes a software breakpoint at the cursor position in the Source Window or Assemble Window.
Delete All Breakpoints	Deletes all the set break events.
Uncond. Trace ON **[IECUBE]**	Validates unconditional trace so that trace can always be executed during program execution. (default) At this time, the set trace event conditions are ignored. The trace mode cannot be changed while the tracer is activated.
Cond. Trace ON **[IECUBE]**	Validates conditional trace and traces in accordance with the trace event condition during program execution. The trace mode cannot be changed while the tracer is activated.
Tracer Control Mode **[IECUBE]**	Sets trace control mode.
Non Stop	Goes around the trace memory and overwrites data from the oldest frame (default).
Full Stop	Goes around the trace memory and then stops the tracer.
Full Break	Goes around the trace memory and then stops the tracer and program execution
Delay Trigger Stop	Traces data by the number of delay count frames and stops the tracer when a delay trigger event has occurred.
Timer Start/Timer Stop **[IECUBE]**	Starts timer measurement when it is stopped, or stops it when it is in progress. This item is invalid if the program is not being executed and if a timer event is not used.Immediately after program execution has been started, timer measurement is in progress.
Tracer Start/Tracer Stop **[IECUBE]**	Starts the tracer when it is stopped, or stops it when it is in progress. This item is invalid if the program is not being executed.Immediately after program execution has been started, the tracer is executed.

(6) [Event] menu

Event Manager	Manages various event conditions. Opens the Event Manager.  Same operation as this button.
Software Break Manager	Manages software break event conditions. Opens the Software Break Manager.
Event...	Registers an event condition. Opens the Event Dialog Box.  Same operation as this button.
Event Link...	Registers an event link condition. Opens the Event Link Dialog Box.
Break...	Registers and sets a break event condition. Opens the Break Dialog Box.  Same operation as this button.
Trace... **[IECUBE]**	Registers and sets a trace event condition. Opens the Trace Dialog Box.  Same operation as this button.

Timer... **[IECUBE]**	Registers and sets a timer event condition. Opens the Timer Dialog Box.  Same operation as this button.
Delay Count... **[IECUBE]**	Sets the delay count. Opens the Delay Count Dialog Box.

(7) [Browse] menu

List	Lists functions, variables, symbols, sections, and interrupt requests. Opens the List Window.
Source Text	Displays a source text. Opens the Source Window. If there is this window already open in the active status, it is opened in the static status.  Same operation as this button.
Assemble	Displays the disassemble results. Opens the Assemble Window. If there is this window already open in the active status, it is opened in the static status.  Same operation as this button.
Memory	Displays the contents of the memory. Opens the Memory Window. If there is this window already open in the active status, it is opened in the static status.  Same operation as this button.
Watch	Displays the watch contents. Opens the Watch Window.  Same operation as this button.
Register	Displays the register contents. Opens the Register Window.  Same operation as this button.
I/O Register	Displays the contents of the Peripheral I/O registers. Opens the IOR Window.  Same operation as this button.
Local Variable	Displays the local variable. Opens the Local Variable Window.  Same operation as this button.
Stack Trace	Displays the stack trace results. Opens the Stack Window.  Same operation as this button.
Trace **[IECUBE]**	Displays the trace results. Opens the Trace View Window.  Same operation as this button.
Code Coverage **[IECUBE]**	Displays code coverage measurement results. Opens the Code Coverage Window.  Same operation as this button.
Console	Opens the Console Window.
Others	Displays other windows. (Refer to "APPENDIX A EXPANSION WINDOW".) Displays a user-defined window list. Displays a name of *.tcl file in the bin\idtcl\tools\ folder (except the extension)

(8) [Jump] menu

Source Text	Displays the corresponding source text and source line, using the data value selected in the current window as the jump destination address. If no line information exists at the jump destination address, however, you cannot jump. Opens the Source Window. If the Source Window in active is open, that window is displayed in the forefront (so that it can be manipulated).
Assemble	Disassembles and displays the results from the jump destination address specified by the data value selected in the current window. Opens the Assemble Window. If the Assemble Window in active is open, that window is displayed in the forefront (so that it can be manipulated).
Memory	Displays the memory contents from the jump destination address specified by the data value selected in the current window. Opens the Memory Window. If the Memory Window in active is open, that window is displayed in the forefront (so that it can be manipulated).

(9) [Window] menu

New Window	Opens a new window displaying the same contents as those of the current window.This menu is valid only when the current window is Source Window, Assemble Window or Memory Window.
Cascade	Cascade display of the windows in the Main window.
Tile	Cascade display of the windows in the Main window.
Arrange Icons	Rearranges the icons in the Main window.
Close All	Closes all windows, except the Main window.
Refresh	Updates the contents of the window with the latest data.
Active	Sets the window in the active status.
Static	Sets the window in the static status.
(Open Window)	Lists the windows that are open. The window with the check mark shown on the side of the figure is the current window. By selecting a window name, the selected window is used as the current window.

(10) [Help] menu

ID850QB Help	Displays the help.
Command Reference	Opens the Help window of COMMAND REFERENCE.
Main Window	Displays the help of the Main window.
Current Window	Displays the help of the current window.
About...	Displays the version of the ID850QB. Opens the About Dialog Box.

Tool bar

(1) Meaning of each button

The meaning of each button on the toolbar is as follows.When the mouse cursor is placed on a button of the toolbar, a tool hint pops up several seconds later.

 **Stop**	Stops execution of the user program. Same function as [Run] menu -> [Stop].
 **ReGo**	Resets the CPU and executes the user program. Same function as [Run] menu - > [Restart].
 **Go**	Executes the user program from the current PC without resetting the CPU. Same function as [Run] menu -> [Go].
 **Go**	Ignores break points being set, and executes the user program. Same function as [Run] menu -> [Ignore break points and Go].
 **Ret**	The user program is executed until execution returns Same function as [Run] menu - [Return Out]. **Note:** This command is used for a function described in C language.
 **Step**	Step execution (executes instructions in the program one by one.) If a function or subroutine is called, its instructions are executed one by one. Same function as [Run] menu -> [Step In].
 **Over**	Next step execution (executes the program, assuming a function/call statement as one step.) If a function or subroutine is called, its instructions are not executed on a step-by-step basis. Same function as [Run] menu -> [Next Over].
 **Res**	Resets the CPU. Same function as [Run] menu -> [CPU Reset].
 **Open**	Opens the View File Load Dialog Box. Same function as [File] menu -> [Open...].
 **Load**	Opens the Download Dialog Box. Same function as [File] menu -> [Download...].
 **Proj**	Opens the Project File Load Dialog Box. Same function as [File] menu -> [Project] -> [Open...].
 **Src**	Displays the source text. Opens the Source Window. Same function as [Browse] menu -> [Source Text].
 **Asm**	Displays the disassemble results. Opens the Assemble Window. Same function as [Browse] menu -> [Assemble].
 **Mem**	Displays the contents of the memory. Opens the Memory Window. Same function as [Browse] menu -> [Memory].
 **Wch**	Displays the watch contents. Opens the Watch Window. Same function as [Browse] menu -> [Watch].
 **Reg**	Displays the register contents. Opens the Register Window. Same function as [Browse] menu -> [Register].

IOR	Displays the contents of the peripheral I/O registers. Opens the IOR Window. Same function as [Browse] menu -> [I/O Register].
Loc	Displays the local variable contents. Opens the Local Variable Window. Same function as [Browse] menu -> [Local Variable].
Stk	Displays the stack trace results. Opens the Stack Window. Same function as [Browse] menu -> [Stack Trace].
TrW [IECUBE]	Displays the trace results. Opens the Trace View Window. Same function as [Browse] menu -> [Trace].
Cov [IECUBE]	Displays code coverage measurement results. Opens the Code Coverage Window. Same function as [Browse] menu -> [Code Coverage].
Mgr	Opens the Event Manager. Same function as [Event] menu -> [Event Manager...].
Evn	Registers and sets events. Opens the Event Dialog Box. Same function as [Event] menu -> [Event...].
Brk	Registers and sets break events. Opens the Break Dialog Box. Same function as [Event] menu -> [Break...].
Trc [IECUBE]	Registers and sets trace events. Opens the Trace Dialog Box. Same function as [Event] menu -> [Trace...].
Tim [IECUBE]	Registers and sets timer events. Opens the Timer Dialog Box. Same function as [Event] menu -> [Timer...].

(2) Operation of tool bar

Whether the toolbar is displayed or not can be specified by selecting [Option] menu -> [Tool Bar].

This toolbar can be displayed in the following two modes. The modes are selected in the Debugger Option Dialog Box.

Figure 6-2 Tool Bar (Picture Only)

Figure 6-3 Tool Bar (Picture and Text)

Window display area

This area displays various debug windows.

The displayed window can be changed in size or an icon can be created in this area.

Status bar

The status bar displays the status of the ID850QB and in-circuit emulator.

While the user program is being executed, the status bar is displayed in red.

Whether the toolbar is displayed or not can be specified by selecting [Option] menu -> [Status Bar].

Remark: If the screen resolution is low (800 - 600, etc.), all the statuses may not be displayed on the status bar.

Figure 6-4 Status Bar

(1) Program name	Displays the program file name indicated by the PC value.
Source name	Displays the source file name indicated by the PC value.
Line number	Displays the line number indicated by the PC value.
(2) Function name	Displays the function name indicated by the PC value.
(3) PC value	Displays the current PC value.
(4) CPU status	Refer to "Table 6-2 CPU Status".
(5) IE status	Refer to "Table 6-3 IE Status". (If there are two or more the statuses, they delimited with '|' and displayed.)
(6) Break Cause	Refer to "Table 6-4 Break Cause".
(7) STEP mode	Displays the step execution mode. Displays that the following modes are selected from the [Option] menu: SRC:..... Source mode INST:..... Instruction mode AUTO: ..... Automatic mode
(8) Key input mode	Displays the key input mode. INS: ..... Insertion mode OVR:..... Overwrite mode The Memory Window is fixed to OVR mode.

Table 6-2 CPU Status

Display	Meaning
HALT	Halt mode
STOP/IDLE	Software stop mode, hardware stop mode, Idle mode
HOLD	Bus hold mode
WAIT	Wait mode
RESET	Reset mode
POW OFF	Power is not supplied to the target

Table 6-3 IE Status

Display	Meaning
RUN	User program execution in progress (the color of the status bar changes).
STEP	Step execution in progress.
TRC	Tracer operating **[IECUBE]**
TIM	Timer operating **[IECUBE]**
COV	Coverage operating **[IECUBE]**
BREAK	Break occurring.
Time	Displays the result of measuring the time from the start of user program execution to the occurrence of break. (Run-Break time)**Note**
TIMER OVERFLOW	Measurement result overflowed.

Note: It is possible to measure for 20 ns or more until 195.2 hours. (4K division) **[IECUBE]**
It is possible to measure for 200 ns or more until 7 minutes. (DCK=10MHz) **[MINICUBE]**
It is possible to measure for 100 us or more until 100 hours. **[MINICUBE2]**

Caution: If the target power supply is turned off during a break when using MINICUBE and N-Wire CARD, RUN state is displayed.
This state is released when the target power supply is turned on.
This is not an abnormal operation.
Do not turn off the target power supply during debugging using MINICUBE2.

Table 6-4 Break Cause

Display	Meaning
Manual Break	Forced break
Temporary Break	Temporary break
Software Break	Software break
Trace Full Break	Break due to trace full **[IECUBE]**
Non Map Break	Non-mapped area is accessed. **[IECUBE]**
Write Protect	An attempt has been made to write to a write-protected area. **[IECUBE]**
IOR Illegal	An illegal access is made to a peripheral I/O register. **[IECUBE]**
Timer Over Break	Execution time-over detected **[IECUBE]**
Flash Macro Service	Flash macro service in progress **[MINICUBE]**
IRAM Write Protect (xxx xxx)	During break, performed verify check of IRAM guarded area and rewrote value. **[IECUBE]** xxx xxx indicates the relevant address and data (in case of multiple items, only first item is displayed).
Illegal Opcode Trap	Break due to illegal opcode trap **[IECUBE]**
Event Break "*Event name* or *Event link name*"	Stopped due to event cause of displayed event name or event link name.

Configuration Dialog Box

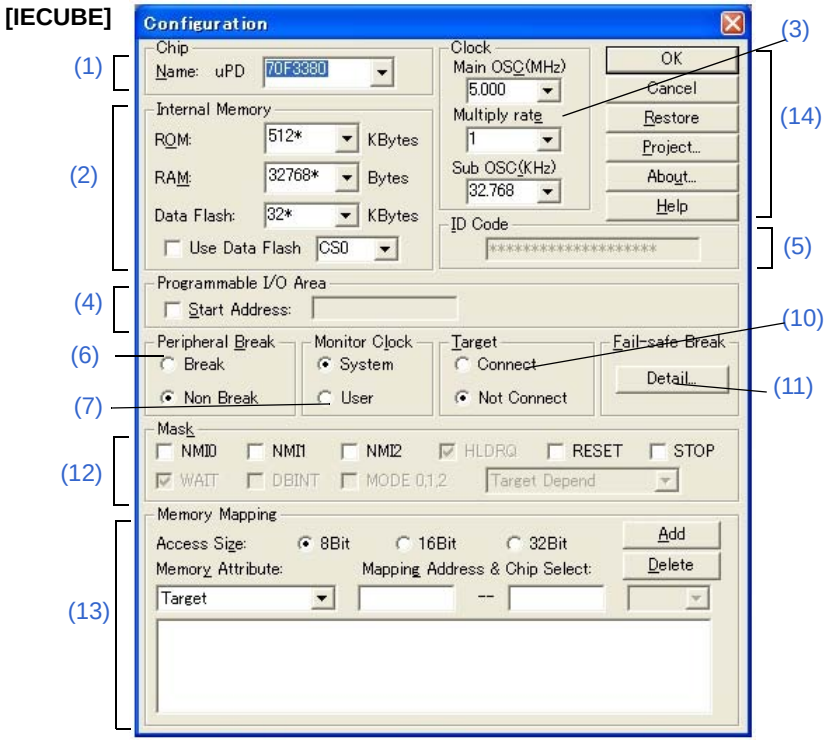
This dialog box is used to display and set the ID850QB operation environment. (Refer to "5.1 Setting Debugging Environment".)

This dialog box is automatically displayed after the ID850QB is started up.

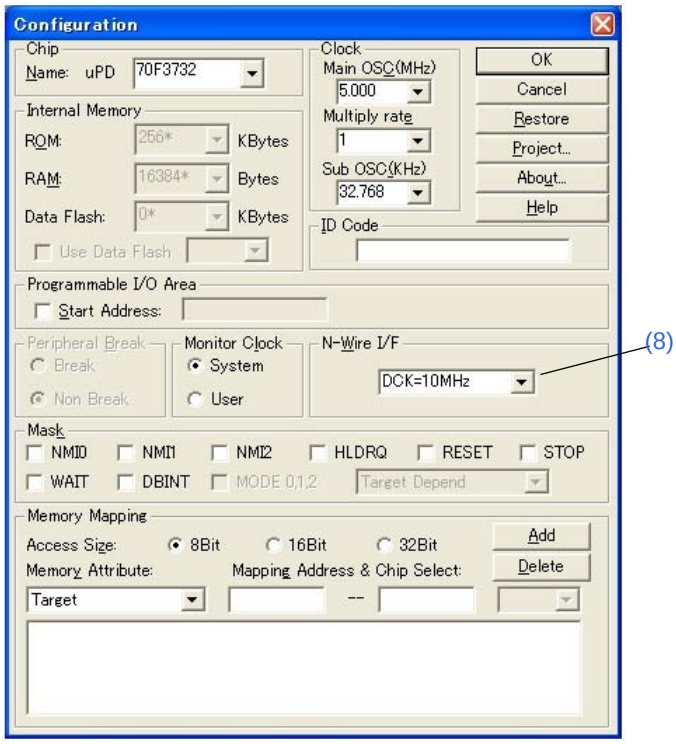
However, no setting is required to read a project as the results of reading the project file are reflected in this dialog box. (Refer to "5.15.1 Debugging environment (project file)".)

Caution: Devices incorporating a pin to switch ROMless mode 0 and 1, and single-chip mode 0 and 1 are not supported. **[MINICUBE] [MINICUBE2]**

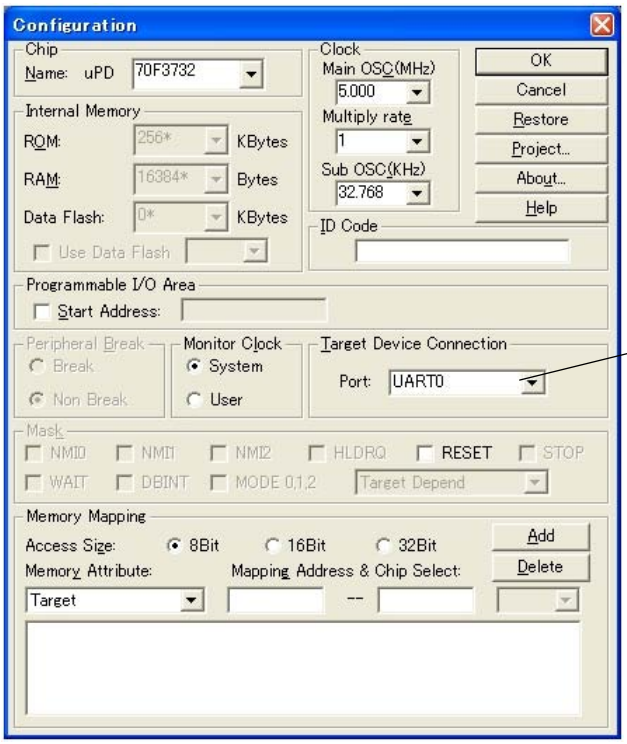
Figure 6-5 Configuration Dialog Box



[MINICUBE]



[MINICUBE2]



- Opening
- Explanation of Each Area

Opening

(Automatically when the ID850QB is started up)

Select [Option] -> [Configuration...] from the menu bar.

Explanation of Each Area

(1) Chip

This area is used to select the chip name. A chip name is selected from the drop-down list.

On the drop-down list, only the chip names registered to the registry from the device file installer are displayed. This area can be specified only when the debugger is started up.

Caution1: The device selected at the ID850QB activation cannot be changed after activation. The device specified by the project file is not used even if the project file of a device different from the target device is downloaded.

Caution2: The error message " F0c2e : There is no response from flash macro service." may be displayed in the following cases.

- If the ID850QB is started up after selecting a device file that does not correspond to the actual device.
- If the ID850QB is started up after selecting a device file that does not correspond to the actual device, and a load module is downloaded to the flash memory.

There is a possibility that the device connected to the N-Wire CARD and the device selected by the ID850QB do not match. Check the device specified in the Configuration dialog box. **[MINICUBE] [MINICUBE2]**

Remark: By default, the type selected at the previous startup is displayed, but if that type is not registered, the first type registered is displayed.

(2) Internal Memory

This area is used to set the each size of the internal memory of the CPU. It is selected from the drop-down list, or input from the key board.

The default size is obtained from the device file through selection in "Chip" , and displayed (value with '*').

This area is not available when using **[MINICUBE2]** or **[MINICUBE]**. The value is fixed to the one defined in the device file.

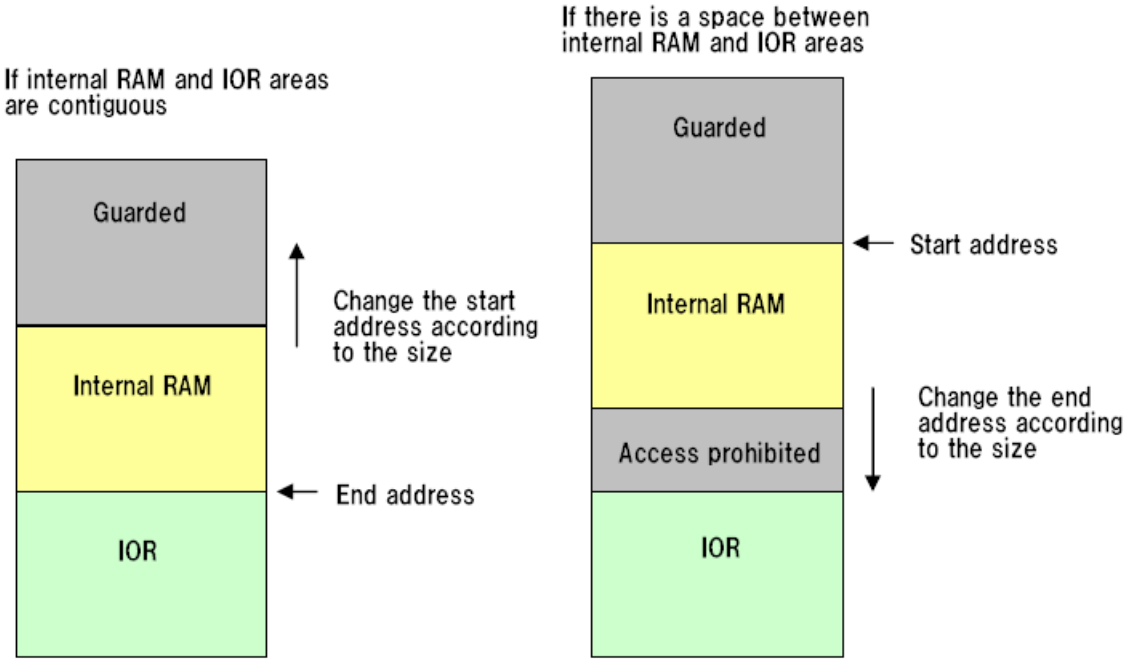
Area	Meaning	Settable Range
ROM:	Sets the Internal ROM size	0, 8, 32, 64, 128, 256, 512, 1024 (KB)
RAM:	Sets the Internal RAM size	4096, 12288, 28672, 61440 (Bytes)
Data Flash:	Displays the data flash memory (when using a device incorporating the data flash memory). To use the data flash memory area, select the "Use Data Flash:" checkbox. When using the V850ES microcontrollers, specify Chip Select that is used for mapping of the data flash memory, in the "Chip Select area".	
Use Data Flash:		
Chip Select area		

Remark: When using a device with VSB Flash or VSB RAM, each area is added to the default internal ROM size and internal RAM size.
When using the V850E/Dx3, for example, the maximum internal ROM size is shown as 2 MB, and the maximum internal RAM size is shown as 84 KB.

If the internal RAM area and the peripheral I/O register area become contiguous as a result of changing the internal RAM size, fix the end address and then change the start address of the internal RAM size (see the table below). **[IECUBE]**

64M device	**Internal RAM size (bytes)**	**Internal RAM start address**
	4096	0x3ffe000
	12288	0x3ffc000
	28672	0x3ff8000
	61440	0x3ff0000
256M device	**Internal RAM size (bytes)**	**Internal RAM start address**
	4096	0xfffe000
	12288	0xfffc000
	28672	0xfff8000
	61440	0xffff000

If there is a space between the internal RAM and the peripheral I/O register area, fix the internal RAM start address and then change the end address of the internal RAM size (see the figure below). If the internal RAM area overlaps the peripheral I/O register area, fix the internal RAM end address and then change the start address.



(3) Clock

Settings related to the main clock and subclock are performed here.

Main OSC (MHz)	Specifies a frequency before the main clock is multiplied. A frequency can be selected from the drop-down list (5.000, 8.000, 13.500, or 18.000) or directory input.
Multiply rate	Specifies the main clock multiplication rate. This value can be selected from the drop-down list (1 to 10), or directly input.
Sub OSC (KHz)	Specifies the subclock frequency (setting this parameter is disabled for types that do not have a subclock). A frequency can be selected from the drop-down list or directory input.

(4) Programmable I/O Area

This area is used to specify use of the programmable I/O area and the start address.

The start address of the programmable I/O area can be specified, only if the device selected by "Chip" supports the programmable I/O area. The start address of the programmable I/O area can be input by selecting the checkbox when the programmable I/O area is used. The address is aligned to 16 KB.

Remark: In the case of a device with an extended I/O area with fixed addresses, the device selected by "Chip", Setting of this area is performed automatically.

(5) ID Code [MINICUBE] [MINICUBE2]

This area is used to input the ID code to be used when the code on the internal ROM or internal flash memory is read by ID850QB (ID code authentication)

Input a hexadecimal number of 20 digits (10 bytes) as the ID code (all 'F' by default).

The ID code is saved to the registry. If inputting the ID code fails three times, the ID850QB is forcibly terminated.

Remark1: This area does not have to be set with a ROMless product or a product without a RCU (security unit).

Remark2: For the details of ID code authentication, refer to N-Wire CARD, MINICUBE or MINICUBE2 User's Manual.

(6) Peripheral Break

This area is used to specify whether the peripheral emulation function of in-circuit emulator is stopped during a break.

Break	Stopped
Non Break	Not stopped (default)

Caution: Whether or not to stop the peripheral I/O functions during a break can be selected only when the peripheral I/O has that function.

(7) Monitor Clock [IECUBE]

This area is used to specify whether the operation clock of the monitor program is switched from the sub clock to the main clock during a break.

This area does not have to be set with a product without a sub clock.

System	The operation clock is switched to the main clock and the monitor program is executed (default). **Note:** In the ID850QB, the clock is changed by manipulating PCC, but not while the main clock is stopped. If the operation clock is switched to the main clock during a break, the clock is returned to the previous setting when execution returns to the user program.
User	The monitor program is executed with the clock selected by the user program.

(8) N-Wire I/F [MINICUBE]

This area is used to select a clock supplied form N-Wire CARD or MINICUBE to the on-chip debug unit (DCU). In default, a 10 MHz clock is supplied.

Caution: Usually, 10 MHz clocks must be selected. When a 20 MHz clock is selected, the ID850QB may not start operating.

DCK=10MHz	The DCK clock is 10 MHz (in default). **Remark:** During selection, the maximum value of the measurement time of the execution time measurement function is doubled, and that of the resolution of the execution time measurement function is reduced by half.
DCK=20MHz	In this case, the DCK clock is 20 MHz.

(9) Target Device Connection [MINICUBE2]

This area is used to select the port to be connected for serial communication between MINICUBE2 and the device on the target system.

MINICUBE2 supports UART and CSI-H/S as a communication interface.

The type of selectable ports varies depending on the device used.

(10) Target [IECUBE]

This area is used to select whether the target board is to be connected to the in-circuit emulator or not. (Refer to "Table 3-2 Error Message Output Pattern [IECUBE]".)

Connect	Be connected
Not Connect	Not be connected

Remark: It is used to detect an illegal power supply status.

The default is determination by detecting the power (TVDD) of the target.

(11) Fail-safe Break [IECUBE]

This area is used to select the fail-safe break function. Clicking the <Detail...> button opens the Fail-safe Break Dialog Box, so that the fail-safe break function can be individually set.

(12) Mask

This area is used to mask the signal sent from the target.

The signal of a masked pin is not input to the in-circuit emulator.

Mask a pin only when the operation of the target system is not stable at the debugging stage.

Remark1: By selecting RESET, the external reset or internal reset generated by the watchdog timer can be masked. At this time, whether internal reset can be masked or not depends on the device.

Remark2: If a device file supporting TM tag is used, however, select Mode00 to Mode1F (the modes to be displayed are determined by the definition of the device file). When the IECUBE is connected and when the target is connected, Target Depend can be selected.

(13) Memory Mapping

This area is used to set the mapping.

Select the memory access size with "Access Size", specify the mapping attribute with "Memory Attribute", and specify the address range with "Mapping Address".

The memory setting is performed by clicking the <Add> button, and the result is listed in the area at the bottom of the window.

The mappable area depends on the product type.

Access Size	Selects memory access size. This setting is used to specify the access size on the ID850QB software; the operation of the external bus hardware is set in accordance with the settings of the MODE pin and I/O register.	
	8Bit	Accesses memory with ld.b instruction/st.b instruction.
	16Bit	Accesses memory with ld.h instruction/st.h instruction.
	32Bit	Accesses memory with ld.w instruction/st.w instruction.
Memory Attribute	The following mapping attributes can be selected. Select a mapping attribute according to the usage. (Refer to "Table 5-2 Mapping Attribute".)	
	Emulation ROM **[IECUBE]**	(With memory board) Selects the in-circuit emulator alternate ROM. The mapping unit is 1MB.
	Emulation RAM **[IECUBE]**	(With memory board) Selects the in-circuit emulator alternate RAM. The mapping unit is 1MB.
	Target	Selects the target memory. The mapping unit is 1byte.
	Target ROM **[IECUBE]**	Selects the target ROM.
	I/O Protect	Selects the I/O protect area. The I/O protect area can be set in the area that is specified in the Target field. Since the area set as the I/O protect area is displayed with symbol "??" in the Memory Window like unmapped areas, read/write to this area cannot be performed freely in the Memory Window, which protects this area from being erroneously read or writte. The mapping unit is 1 byte.

Mapping Address & Chip Select[Note] **[IECUBE]**	Specify the address to be mapped. Input the higher and lower addresses from the keyboard. Since the areas that are specified in the emulation memory are composed of 16 MB (16 banks of 1 MB memory), those areas can be allocated to any location in CS0 through CS7 with the chip select function. (Select one from the drop-down list.) Allocation addresses can be allocated to any 1 MB boundary. Multiple banks can be assigned to one single CS.

<Add> <Delete>	These buttons are used to set and delete mapping. By clicking the <Add> button, mapping is set as specified in each area and the result is listed in the area at the bottom of the window. To delete a mapped item, select the item from the list and click the <Delete> button.

Note: In the case of the V850ES microcontrollers, the allocation of chip selection is fixed, or no chip-selection functions are provided, no selection can be made. No selections can be made if the option board is not installed when the IECUBE is connected.

Caution1: The area set as "I/O Protect" is not read unless it is registered to the IOR Window or Watch Window as an I/O port. To read this area, forcibly read it on these windows.

Caution2: If the external memory is mapped, change the value of a register required for access of an external memory. (Refer to "5.1.4 To change the value of a register required for access of an external memory".)

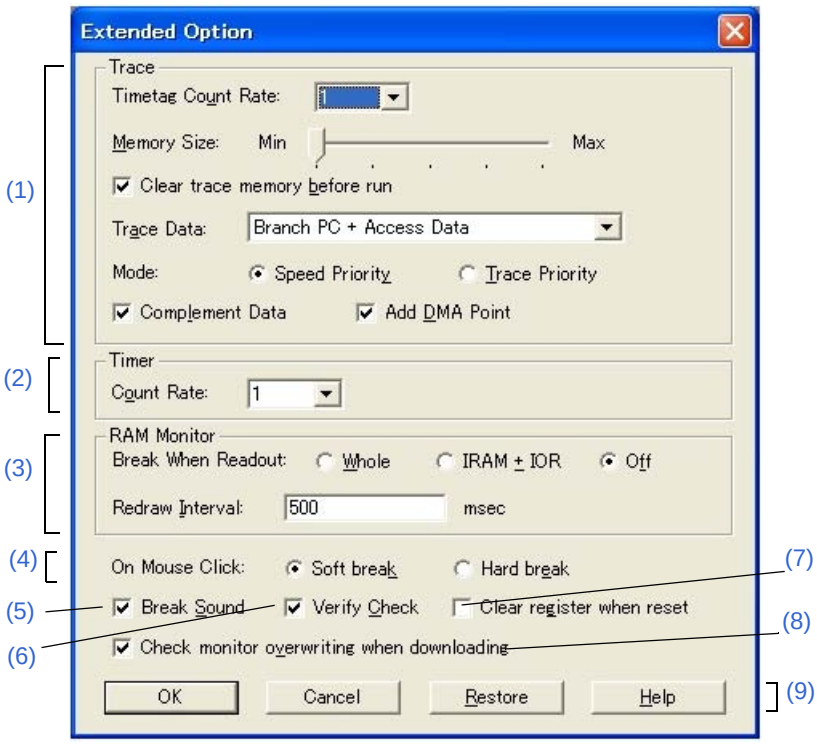
(14) Function buttons

OK	Validates the current environment. Sets the environment and closes this dialog box. If an error occurs after clicking the <OK> button, the ID850QB can no longer continue and is terminated.
Cancel	Cancels the changes and closes this dialog box.
Restore	Restores the previous settings before this dialog box was opened.
Project...	Opens the Project File Load Dialog Box. If an error occurs while a project file is being opened or read, the ID850QB can no longer continue and is terminated.
About...	Opens the About Dialog Box.
Help	Displays the help window of this window.

Extended Option Dialog Box

This dialog box is used to display and set the extended options of the ID850QB. (Refer to "5.1 Setting Debugging Environment".)

Figure 6-6 Extended Option Dialog Box Extended Option Dialog Box



- Opening
- Explanation of Each Area

Opening

Select [Option] menu -> [Extended Option ...].

Explanation of Each Area

(1) Trace [IECUBE]

This area is used to set about trace (refer to "5.10 Trace Function [IECUBE]") (when the IECUBE is connected).

(a) Timetag Count Rate:

This area is used to set the division ratio of the counter used for time tag display in the Trace View Window.

This division ratio is selected from a drop-down list.

If the division ratio is set, the number of clocks necessary for counting up the counter displayed for time tag is changed.

The relationship between the time tag counter division ratio and maximum measurement time is as follows.

Table 6-5 Relationship Between Time Tag Counter Division Ratio and Maximum Measurement Time (Time tag counter (Trace))

Division Ratio	Resolution (ns)	Measurable Maximum Time	Remark
TMCLK (1/1)	20	1.4 minutes	Time tag counter 32 bits, In case of 50 MHz external clock
TMCLK (1/2)	40	2.8 minutes	
TMCLK (1/4)	80	5.7 minutes	
TMCLK (1/8)	160	11.4 minutes	
TMCLK (1/16)	320	22.8 minutes	
TMCLK (1/32)	640	45.6 minutes	
TMCLK (1/64)	1280	1.5 hours	
TMCLK (1/128)	2560	3 hours	
TMCLK (1/256)	5120	6 hours	
TMCLK (1/512)	10240	12.2 hours	
TMCLK (1/1024)	20480	24.4 hours	
TMCLK (1/2048)	40960	48.8 hours	
TMCLK (1/4096)	81920	97.6 hours	

(b) Memory Size:

Set the size of the trace memory (buffer).

In other words, specify a memory size by dragging the knob. The sizes that can be specified are 8K (min.), 32K, 64K, 128K, and 256K (max).

Caution: The larger the value that is set, the greater the number of trace data that are recorded. However, the response when reading trace data becomes correspondingly slower.

(c) Clear trace memory before run

Select this checkbox to clear the trace memory prior to program execution.

(d) Trace Data:

Select the trace data to be collected.

Remark: When [Options] menu -> [RRM Function] is selected, the setting is fixed to Branch PC.
When [Option] menu -> [Coverage Function] is selected, the setting is fixed to All PC.

Table 6-6 Relationship Between Meaning of Trace Data to Be Collected and Trace Collection Mode

Item	Traced Range			
	Branch PC Collects PC values of branch origin and branch destination instructions	**All PC** Collects PC values of all instructions	**Access PC** Collects PC values of instructions that caused access	**Access Data** Collects access address and access data
Branch PC	Traced	--	--	--
All PC	Traced[Note1]			--
Access Data	--	--	--	Traced[Note2]
Branch PC + Access Data	Traced	--	--	Traced[Note2]
All PC + Access Data	Traced[Note1]			Traced[Note2]
Access Data + Access PC	--	--	Traced	Traced[Note2]
Branch PC + Access Data + Access PC	Traced	--	Traced	Traced[Note2]

Note1: When trace data that contains "All PC" is selected, the unconditional trace mode is enabled. In this case, the qualify trace mode and the section trace mode cannot be set at the same time. (The conditional trace setting is disabled.)

Note2: When trace data that contains "Access Data" is selected, when the high-speed priority mode (select Speed Priority in (e) Mode:) is selected, and when access to the internal RAM area is performed 32 times in succession, data may be missed.

(e) Mode:

Specify the trace collection mode.

Remark: When [Option] menu -> [RRM Function / Coverage Function] is selected, the setting is fixed to Speed Priority.

Speed Priority	This mode performs tracing by prioritizing speed (real-time operation). In this mode, data may be missed depending on the trace data to be collected. (Refer to "Table 6-6 Relationship Between Meaning of Trace Data to Be Collected and Trace Collection Mode".)
Trace Priority	This mode performs tracing by prioritizing data collection (non-real-time). Since, in order to reliably collect all the trace data, the CPU's execution pipeline is momentarily stopped when data is likely to be missed, the real-time characteristic of operation in relation to the user program is lost. Trace Priority cannot be selected when Branch PC or All PC is selected in (d) Trace Data:.

(f) Complement Data

Select this checkbox to perform complementary display of trace data (default: selected).

(g) Add DMA Point

Select this checkbox to perform the DMA point trace function. (The checkbox is selected in default.)

When the checkbox is selected, the DMA start and end frames are marked.

(2) Timer [IECUBE]

Set the rate value for the timer counter.

Count RateThe values set in this area are displayed in "Count Rate" of the Timer Dialog Box.

The rate value is selected from a drop-down list.

The relationship between the timer counter division ratio and maximum measurement time is as follows.

Table 6-7 Relationship Between Timer Count Division Ratio and Maximum Measurement Time (Timer counter (Timer))

Division Ratio	Resolution (ns)	Measurable Maximum Time	Remark
TMCLK (1/1)	20	2.8 minutes	Timer counter 33 bits, In case of 50 MHz external clock
TMCLK (1/2)	40	5.7 minutes	
TMCLK (1/4)	80	11.4 minutes	
TMCLK (1/8)	160	22.8 minutes	
TMCLK (1/16)	320	45.6 minutes	
TMCLK (1/32)	640	1.5 hours	
TMCLK (1/64)	1280	3 hours	
TMCLK (1/128)	2560	6 hours	
TMCLK (1/256)	5120	12.2 hours	
TMCLK (1/512)	10240	24.4 hours	
TMCLK (1/1024)	20480	48.8 hours	
TMCLK (1/2048)	40960	97.6 hours	
TMCLK (1/4096)	81920	195.2 hours	

(3) RAM Monitor

(a) Break When Readout:

Select this item to specify the target range of RAM sampling by instantaneously generating a break in the user program execution. (Refer to "5.13.2 Pseudo real-time monitor function (Break When Readout)".)

Whole	Whole memory space.[Note] **Remark:** The user program execution is stopped for a long time when a large number of windows are opened because the range from which memory is read out is wid.
IRAM + IOR	Internal RAM area and IOR area
Off	Disables the Pseudo real-time monitor function (Break When Readout)(default).

Note: The range specified in the RRM Setting Dialog Box is excluded.

(b) Redraw Interval:

Specify the sampling time (ms) of the RAM sampling.

It can be specified in 100-ms units from 0 to 65500.

If 0 is specified, or if this area is blank, the data is not displayed in real time.

(4) On Mouse Click:

This area is used to select whether a software breakpoint or hardware breakpoint is set as the default breakpoint if a breakpoint is set in the point mark area by clicking the mouse button in the Source Window or Assemble Window (refer to "5.4.2 Breakpoint setting").

Soft break	Sets a software breakpoint.
Hard break	Sets a hardware breakpoint.

(5) Break Sound

If the checkbox is selected, a beep sound is issued when a break occurs.

(6) Verify Check

This area is used to specify whether a verify check is performed when data has been written to memory.

A verify check is performed when download, memory fill, or memory copy is executed. A verify check is also performed when a variable or data is changed in the Watch Window or Memory Window and is written to memory.

Caution: During write to the internal flash memory (including download), verify check is not performed whether or not the checkbox in this area is selected, and internal verify of flash self-write is always performed (read verify is not performed). **[MINICUBE]**

(7) Clear register when reset

Select this checkbox in order to clear the program registers (r1 to r31) and registers EIPC, EIPSW, FEPC, FEPSW, CTPC, CTPSW, and CTBP upon CPU reset.

Under the default setting, the registers are not cleared.

(8) Check monitor overwriting when downloading [MINICUBE2]

Select this checkbox to output an error (F0c34) when overwriting to an area reserved for use by MINICUBE2 is attempted (default : selected).

(9) Function buttons

OK	Validates the settings and closes this dialog box.
Cancel	Cancels the changes and closes this dialog box.
Restore	Restores the previous settings before this dialog box was opened.
Help	Displays the help window of this window.

Fail-safe Break Dialog Box

[IECUBE]

This dialog box is used to perform the fail-safe break settings. (Refer to "5.4.5 Fail-safe break function [IECUBE]".)

When a project file is read, the results obtained by reading this project file are reflected in this dialog box.

Remark: For details on the fail-safe break function, refer to the user's manuals of the in-circuit emulator and the emulation board that are used.

Figure 6-7 Fail-safe Break Dialog Box

- Opening
- Explanation of Each Area
- Cautions

Opening

Click the <Detail...> button in the Configuration Dialog Box.

Explanation of Each Area

(1) Protect

The fail-safe break protect settings are performed in this area.

The fail-safe breaks corresponding to the selected checkboxes are protected.

Under the default setting, all checkboxes are selected.

Internal ROM:	This area is used to perform the protect settings for the internal ROM area.	
	Non Map	Access to access prohibited area
	Write	Write to write prohibited area
Internal RAM:	This area is used to perform the protect settings for the internal RAM area.	
	Non Map	Access to access prohibited area
I/O Register:	This area is used to perform the protect settings for the peripheral I/O registers area.	
	Non Map	Access to access prohibited area
	Read	Read to read prohibited area
	Write	Write to write prohibited area
External Memory:	This area is used to perform the protect settings for the external memory area.	
	Non Map	Access to access prohibited area
	Write	Write to write prohibited area

(2) Verify

This area is used to perform the verify settings for fail-safe breaks.

Verify check is performed during access to the items corresponding to the selected checkboxes.

Internal RAM:	This area is used to perform the verify check setting in the internal RAM area.	
	Non Map Write	Write to write prohibited area

(3) Function buttons

OK	Validates the settings and closes this dialog box.
Cancel	Closes this dialog box.
Help	Displays this dialog box online help files.

Cautions

(1) Usually a Non Map Break (fail-safe break) occurs in the emulator when a program is fetched from the area not used by the program, but it does not occur in the 16-byte space at the beginning of the unused area.When the V850ES/SG2 with a 256 KB internal ROM is used, for example, the Non Map Break does not occur in the 16-byte area from 0x40000 to 0x4000F.

RRM Setting Dialog Box

[IECUBE]

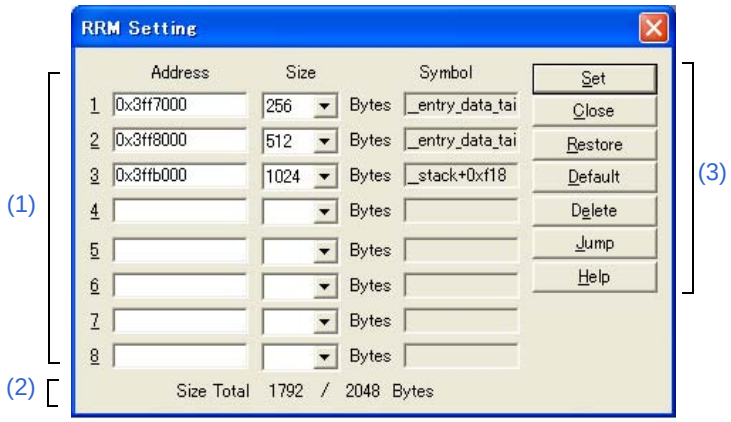
This dialog box is used to set the sampling range for the RRM function. (Refer to "5.13 RRM Function".)

Up to 8 locations can be specified in 256-byte units as the sampling range.

The total of the sizes specified for the 8 locations cannot exceed 2048 bytes.

Caution: This dialog box cannot be opened when an item other than [RRM Function] has been selected in the [Option] menu.

Figure 6-8 RRM Setting Dialog Box



- Opening
- Explanation of Each Area

Opening

The settings of this dialog box when it is opened differ depending on the opening method.

(a) When settings are performed from RRM Setting Dialog Box

The dialog box is opened by selecting [Option] menu -> [RRM Setting...].

In this case, the data in "Address" and "Size" are input manually.

(b) When settings are performed from the Memory Window

This dialog box is opened by opening the Memory Window, selecting an address in the window, and then selecting [RRM Setting...] from the context menu.

In this case, the selected address is displayed in an empty row in "Address", "256" is displayed in an empty row in "Size", and the value obtained by converting the address to a symbol is displayed in an empty row in "Symbol".

Remark: If the total of the sizes specified for the 8 locations already exceeds 2048 bytes, the dialog box opens but no value can be set.

(c) When settings are performed from the Watch Window

This dialog box is opened by opening the Watch Window, selecting a variable in the window, and then selecting [RRM Setting...] from the context menu.

In this case, the value obtained by converting the variable into an address is displayed in an empty row in "Address", "256" is displayed in an empty row in "Size", and the value obtained by converting the variable to a symbol is displayed in an empty row in "Symbol".

Remark: If the total of the sizes specified for the 8 locations already exceeds 2048 bytes, the dialog box opens but no value can be set.

Explanation of Each Area

(1) Sampling range setting area

Address	This area is used to specify the sampling start address for the RRM function. The default radix for inputting a numeric value is hexadecimal. An address can be also specified by a symbol or expression. (Refer to "Table 5-6 Specifying Symbols".) Following input, click the <Set> button to enable the settings.
Size	This area is used to specify the sampling range from "Address". The values that can be selected are 256, 512, 768, 1024, 1280, 1536, 1792, 2048. However, the total of the sizes specified for the 8 locations cannot exceed 2048 bytes.
Symbol	This area displays the symbols of the addresses specified in "Address" . The specified addresses are displayed as a symbol or as a symbol + offset. If the address has not been set, nothing is displayed.

Remark: When the settings are enabled, the addresses are aligned in 256-byte units, but if an address is duplicate, it is not enabled.

(2) Size Total

This area displays the total of the sizes specified in "Size". If the total exceeds 2048 bytes, it is displayed in red.

(3) Function buttons

Set	Determine the specified sampling range.
Close	Closes this dialog box.
Restore	Restores the previous settings before this dialog box was opened.
Default	Clears the current setting and sets the internal RAM start address in the first row in Address, and "2048" in the first row in Size.
Delete	Deletes the setting for the numbers with a focus.
Jump	Opens the Memory Window and displays the addresses in "Address" whose numbers have a focus. Jump is performed for Memory Window that are in the active status. If multiple memory windows are to be opened, they must be set in the static status. (Refer to "5.16.1 Active status and static status".)
Help	Displays this dialog box online help files.

Flash Option Dialog Box

[IECUBE]

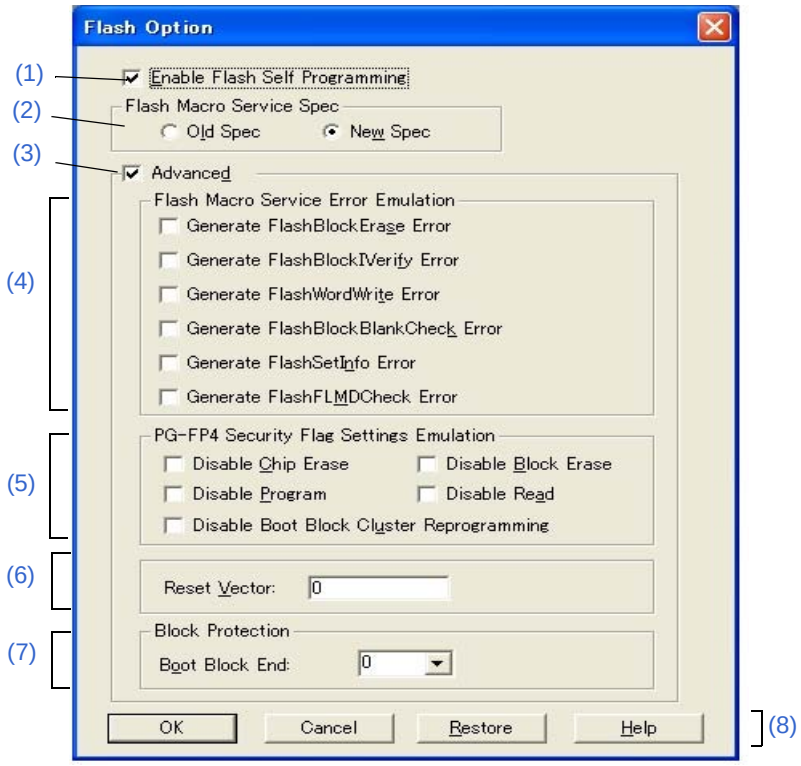
This dialog box is used to make the flash self programming emulation function settings. (Code flash)

This dialog box cannot be opened during user program execution.

For the list of supported devices, the list of availability of emulation for flash function, and the cautions, refer to "Special Notes On Flash Self Programming Emuration".

Caution: This dialog box cannot be opened when using a device that does not incorporate the flash memory.

Figure 6-9 Flash Option Dialog Box



- Opening
- Explanation of Each Area
- Special Notes On Flash Self Programming Emuration

Opening

Select [Option] menu -> [Flash Option...].

Explanation of Each Area

(1) Enable Flash Self Programming

If this item is selected, flash self programing emulation function is enabled.

This enables setting of (3) Advanced. This item is not selected by default.

(2) Flash Macro Service Spec

Select the flash macro service specification type in this area when flash self programing emulation function is enabled.

This area is valid only when the flash memory process is "Type1".

If "New Spec" is selected, "Disable Read" and "Reset Vector" become selectable in (5) PG-FP4 Security Flag Settings Emulation. Input an address within the address range of the internal flash in the "Reset Vector:" field for the reset vector address.

Old Spec	Flash self programming Ver. 2.00 or earlier (default)
New Spec	Flash self programming Ver. 3.00 or later

(3) Advanced

If this item is selected, detailed settings for flash self programing emulation function are enabled.

This enables setting of (4) Flash Macro Service Error Emulation and (5) PG-FP4 Security Flag Settings Emulation. This item is not selected by default.

(4) Flash Macro Service Error Emulation

These items set the operation of the self library function.

When this checkbox is selected, an error value that is returned when flash memory is damaged can forcibly be returned. (The error values that are returned when flash memory is damaged are not returned in normal emulation.)

The settable items are as follows: All items are not selected by default.

Generate FlashBlockErase Error	Returns error values in FlashBlockErace functions.
Generate FlashBlockIVerify Error	Returns error values in FlashBlockIVerify functions.
Generate FlashWordWrite Error	Returns error values in FlashWordWrite functions.
Generate FlashBlockBlankCheck Error	Returns error values in FlashBlockBlankCheck functions.
Generate FlashSetInfo Error	Returns error values in FlashSetInfo functions.
Generate FlashFLMDCheck Error[Note]	Returns error values in FlashFLMDCheck functions.

Note: The IECUBE cannot read the values of the FLMD0 pin. (Normally, with an assumption that a high level is input to the FLMD0 pin, the FlashFLMDCheck functions always return a normal completion.) Check the "Generate FlashFLMDCheck Error" checkbox when errors, which occur when a low level is input to the FLMD0 pin in the case of the FlashFLMDCheck functions, need to forcibly be returned.

(5) PG-FP4 Security Flag Settings Emulation

The initial value of the security flag is emulated when the security has been set to the flash memory using flash memory programmer PG-FP4.

The settable items are as follows: All items are not selected by default.

Disable Chip Erase	Disables/enables chip erase
Disable Block Erase	Disables/enables block erase
Disable Program	Disables/enables write
Disable Read[Note1]	Disables/enables read
Disable Boot Block Cluster Reprogramming[Note2]	Disables/enables boot area rewrite

Note1: Available only when the flash memory process is Type1 (new specification), Type3 or Type4.

Note2: This item is selectable only when the flash memory process is "Type2" or "Type3".

(6) Reset Vector:

Set the reset vector address (default: 0).

If 0 is specified, the actual reset vector address is set to address 4. If a value other than 0 is specified, the specified value is set as the actual reset vector address.

When using an MF2 device, reset vector addresses higher than the end address of the block specified in the Block Protection area cannot be specified (refer to "Table 6-8 Relationship Between Boot Swap Cluster Set Value and Target Range Set Value").

Caution: This area is available only when the flash memory process is Type1 (new specification) or Type4.

(7) Block Protection

This area is used to change the target area of boot swap clusters (default: 0).

The value set in this field is reflected to the target area in a boot block cluster (refer to "Table 6-8 Relationship Between Boot Swap Cluster Set Value and Target Range Set Value").

Prohibition of boot area rewriting can be set to the target area of boot swap clusters by using the device's security function.

Caution1: Since the ID850QB does not support the boot swap function, settings related to the boot swap function are invalid.

Caution2: This area is available only when the flash memory process is Type4.

Table 6-8 Relationship Between Boot Swap Cluster Set Value and Target Range Set Value

Setting Value	In Products with 256 KB or Smaller Flash Memory		In Products with 384 KB or Larger Flash Memory	
	Boot block clusters	Boot swap clusters	Boot block clusters	Boot swap clusters
0	00000H - 007FFH	00000H - 01FFFH	00000H - 007FFH	RESV - 03FFFH
1	RESV - 00FFFH		RESV - 01FFFH	
2	RESV - 017FFH		RESV - 027FFH	
3	RESV - 01FFFH		RESV - 03FFFH	
4	RESV - 027FFH	00000H - 03FFFH	RESV - 04FFFH	RESV - 07FFFH
:	:		:	
7	RESV - 03FFFH		RESV - 07FFFH	
8	RESV - 047FFH	00000H - 07FFFH	RESV - 08FFFH	RESV - 0FFFFH
:	:		:	
15	RESV - 07FFFH		RESV - 0FFFFH	
16	RESV - 087FFH	00000H - 0FFFFH	RESV - 10FFFH	RESV - 1FFFFH
:	:		:	
31	RESV - 0FFFFH		RESV - 1FFFFH	
32	RESV - 107FFH		RESV - 20FFFH	
:	:		:	
127	RESV - 3FFFFH		RESV - 7FFFFH	

RESV: The lowest address in a block that includes reset vector address

(8) Function buttons

OK	Validates the settings and closes this dialog box.
Cancel	Closes this dialog box.
Restore	Restores the previous settings before this dialog box was opened.
Help	Displays this dialog box online help files.

Special Notes On Flash Self Programming Emuration

(1) List of Supported Devices

The following lists the devices that support flash self programming emulation function, as of February 2007.

Table 6-9 Flash Self Programming Emulation Supported Device

Flash Memory Process	Device
Type1	V850ES/Sx2, V850ES/Fx2, V850E/RS1, V850E/IA4, μPD70F3229Y, V850ES/Hx2, V850ES/Jx2
Type3	V850ES/Kx1 (Only for microcontrollers with on-chip single-power-supply flash memory), V850ES/Kx1+, V850ES/Kx2
Type4	V850ES/Sx3, V850ES/Fx3, V850ES/Jx3, V850E/Dx3

(2) List of Availability of Emulation for Flash Function

The following table lists whether or not each flash function can be emulated, and restrictions when performing flash self programming emulation function with the ID850QB. (Emulated: Can be emulated, Restriction: Can be emulated with some restrictions, Not emulated: Cannot be emulated)

Table 6-10 List of Availability of Emulation for Flash Function (Type1)

Flash Function	Functional Outline and Restriction	Availability of Emulation
Type1 (V850ES/Sx2, V850ES/Fx2, V850E/RS1, V850E/IA4, μPD70F3229Y, V850ES/Hx2, V850ES/Jx2)		
FlashEnv	Flash environment initialization/end function	Emulated
FlashBlockErase	One block erasure function	Emulated
FlashWordWrite	One word writing function **Restriction:** If an address in the guard area is specified as the third argument, a fail-safe break occurs at an unexpected address.	Restriction
FlashBlockIVerify	One block internal verify processing function	Emulated
FlashBlockBlankCheck	One block blank check function	Emulated

Flash Function	Functional Outline and Restriction		Availability of Emulation
FlashGetInfo	Flash information acquisition function		
	Option = 2	CPU number and total number of blocks held by CPU **Restriction:** The device name (four-digit number) set in the Configuration dialog box is returned as the CPU number.	Restriction
	Option = 3	Security information	Emulated
	Option = 4	Acquisition of boot area swapping information **Restriction:** Boot area swapping information is not reflected.	Restriction
	Option = 5 + Block number	Acquisition of last address of block	Emulated
FlashSetInfo	Flash information setting function **Restriction:** The boot area swapping setting is ignored.		Restriction
FlashStatusCheck	Function for checking operation status of flash function that was executed most recently **Restriction:** For FlashBlockErase and FlashBlockBlankCheck, the timing at which the return value changes from FE_BUSY to FE_OK differs from that in the actual device.		Restriction
FlashBootSwap	Boot area block swapping function		Not emulated
FlashSetUserHandler	User interrupt handler registration function		Emulated
FlashFLMDCheck	FLMD0 pin status check function		Emulated
FlashSetInfoEx	Flash information setting function **Restriction:** The boot area swapping setting is ignored.		Restriction **Note**
FlashNWordRead	Function for reading *n* words **Restriction:** If an address in the guard area is specified as the third argument, a fail-safe break occurs at an unexpected address.		Restriction **Note**

Note: This function has been added in flash self programming Ver. 5.00 and later.

Table 6-11 List of Availability of Emulation for Flash Function (Type3)

Flash Function	Functional Outline and Restriction		Availability of Emulation
Type3 (V850ES/Kx1(Only for microcontrollers with on-chip single-power-supply flash memory), V850ES/Kx1+, V850ES/Kx2)			
FlashEnv	Flash environment initialization/end function		Emulated
FlashBlockErase	One block erasure function		Emulated
FlashWordWrite	One word writing function **Restriction:** If an address in the guard area is specified as the third argument, a fail-safe break occurs at an unexpected address.		Restriction
FlashBlockIVerify	One block internal verify processing function		Emulated
FlashBlock-BlankCheck	One block blank check function		Emulated
FlashGetInfo	Flash information acquisition function		
	Option = 2	CPU number and total number of blocks held by CPU **Restriction:** The device file name (four-digit number) is returned as the CPU number.	Restriction
	Option = 3	Security information	Emulated
	Option = 4	Acquisition of boot area swapping information **Restriction:** Boot area swapping information is not reflected.	Restriction
	Option = 5 + Block number	Acquisition of last address of block	Emulated
FlashSetInfo	Flash information setting function **Restriction:** The boot area swapping setting is ignored.		Restriction
FlashBootSwap	Boot area block swapping function		Not emulated
FlashFLMDCheck	FLMD0 pin status check function		Emulated
FlashWordRead	Data reading function **Restriction:** If an address in the guard area is specified as the third argument, a fail-safe break occurs at an unexpected address.		Restriction
FlashIVerify	Internal verify function (for EEPROM)		Not emulated
FlashBlankCheck	Blank check function (for EEPROM)		Not emulated
EEPROM_Init	EEPROM area initialization function (for EEPROM)		Not emulated
EEPROM_Write	EEPROM write function (for EEPROM)		Not emulated

Flash Function	Functional Outline and Restriction	Availability of Emulation
EEPROM_Read	EEPROM read function (for EEPROM)	Not emulated
EEPROM_Copy	EEPROM copy function (for EEPROM)	Not emulated
EEPROM_VChK	EEPROM valid area check function (for EEPROM)	Not emulated
EEPROM_Erase	EEPROM erase function (for EEPROM)	Not emulated

Table 6-12 List of Availability of Emulation for Flash Function (Type4)

Flash Function	Functional Outline and Restriction		Availability of Emulation
Type4 (V850ES/Sx3, V850ES/Fx3, V850ES/Jx3, V850E/Dx3)			
FlashInit	Self library initialization function		Emulated
FlashEnv	Flash environment start/end function		Emulated
FlashBlockErase	One block erasure function		Emulated
FlashWordWrite	One word writing function		Emulated
FlashBlockIVerify	One block internal verify processing function		Emulated
FlashBlockBlankCheck	One block blank check function		Emulated
FlashGetInfo	Flash information acquisition function		
	Option = 2	Device information (total number of blocks and device number)	Emulated
	Option = 3	Security flag, last block number of boot block	Emulated
	Option = 4	Device information	Emulated
	Option = 5	Reset vector address	Emulated
	Option = 6 +block number *n*	Last address of block number *n*	Emulated
FlashSetInfo	Flash information setting function **Restriction:** Nothing but information setting is performed. The boot area swapping setting is ignored.		Restriction
FlashStatusCheck	Checking of flash function operation that was performed last **Restriction:** SELFLIB_BUSY is not returned.		Restriction
FlashBootSwap	Boot area block swapping function **Restriction:** Functions can be called but boot swapping is not executed.		Not emulated

Flash Function	Functional Outline and Restriction	Availability of Emulation
FlashFLMDCheck	FLMD0 pin status check function	Emulated

(3) Cautions

The cautions on performing flash self programming are described below.

No.	Description
1	Flash self emulation function in the following case. (a) The internal ROM size is not set to the default size Workaround: Set the default size to the internal ROM size in the Configuration Dialog Box. (b) When two breaks before execution are used Workaround: Disable or delete one of the breaks before execution.
2	When flash self programming emulation function is enabled, the following restrictions are applied to the debug function. (a) The internal ROM and internal RAM sizes cannot be changed. (b) The DMM and pseudo RRM functions are disabled. (c) An illegal break occurs in the program if the SP register value is 0 (not pointing to the internal RAM). If a break such as an event occurs before the SP register value is initialized to point to a relevant location (such as internal RAM), then it causes an illegal break for the stack area. If there is a possibility that such a break will occur during this period, set a relevant value to SP before executing the program. (d) If "Clear register when reset" is selected in the Extended Option Dialog Box, the values of the R3 register that have been changed by a flash macro service are cleared during reset emulation. (e) An illegal break may occur if the restriction shown below applies to the IECUBE used. Clear the Non Map checkbox for the Internal RAM in the Fail-safe Break Dialog Box. - An illegal break occurs during program execution in internal RAM
3	When flash self programming emulation function is enabled, the 4-byte area starting from address 0 is reserved, a 4-byte instruction jr 0xfffd6 is written to address 0.Therefore, when using this function at a reset vector address 0, allocate a startup routine to the area starting from address 4. If flash self programming emulation is disabled, 0 is written to the four bytes area starting from address 0. Do no describe codes in which execution branches to address 0, even if this function is used as a reset vector address 0. It is recommended to perform description as shown below in order to operate the same program as the one generated by emulation, in the actual device. # RESET handler (in the case of address 0) .section "RESET", text jr __start --Overwritten by jr 0xfffd6 jr __start
4	If address 0 is specified as the reset vector handling specification address, the reset vector is set to address 4. If an address other than address 0 is specified, then the specified address is set as the reset vector without incrementing the value by four.
5	Regarding the operation of FlashStatusCheck() after FlashBlockErase() and FlashBlockBlankCheck() during emulation, the timing at which the return value of FlashStatusCheck() changes from FE_BUSY to FE_OK differs from that in the actual device.

No.	Description
6	If the address specified as the third argument of FlashWordWrite, FlashWordRead, or FlashNWordRead is located in the guard area, then an illegal memory address is accessed, and a fail-safe break occurs at an unexpected address. Correct the address to a relevant one for FlashWordWrite, FlashWordRead, or FlashNWordRead.
7	To enable the settings made in the Flash Option Dialog Box, be sure to reset the CPU and reexecute the program; otherwise, the setting may not take effect.
8	Secure a stack area of at least 84 (54H) bytes for the debugger's workspace. The debugger consumes a stack area of at least 84 (54H) bytes when a break occurs or during emulation processing of flash memory writing.When interrupts are enabled, a stack area of another 84 (54H) bytes is required as the debugger's workspace. If multiple interrupts are enabled, a stack area of 84 (54H) bytes must be secured per stage.
9	The data in the internal RAM is corrupted after a CPU reset. Normally, the internal RAM data after reset is not guaranteed in the actual device, but note that the operation may vary.
10	If a flash function is not used in accordance with the specifications or an unsupported flash function is called, "1" is returned.
11	The following restrictions apply to emulation of Type4. (1) An area of 48 bytes from the internal RAM end address is reserved for use by the debugger. (2) When using a device with a 1 MB internal flash memory, the internal flash area starting from address 0xFF300 or higher will be used by the debugger. (3) If a flash function is executed stepwise in assemble mode, the debugger code for emulation will be executed, which is different from the code actually executed by the device. During debugging, therefore, perform stepwise execution in source mode.

Data Flash Option Dialog Box

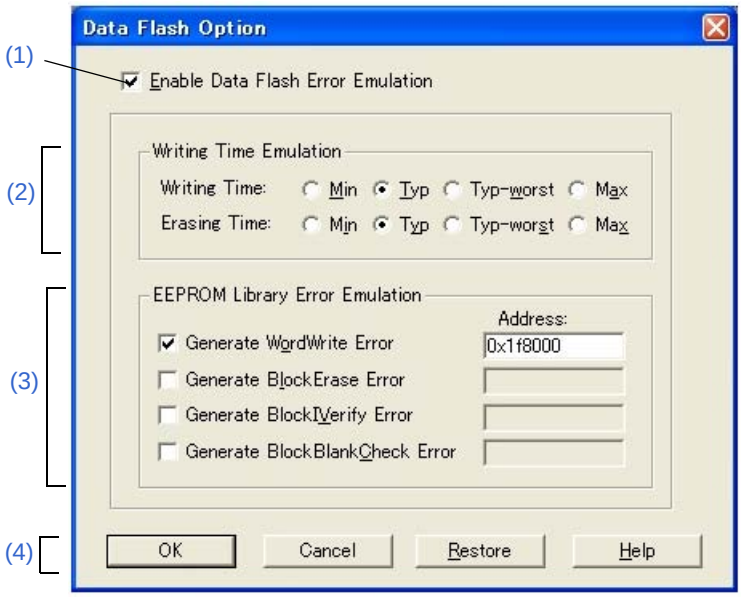
[IECUBE]

This dialog box is used to make the data flash error emulation function settings. (Data flash)

This dialog box cannot be opened during user program execution.

Caution: This dialog box cannot be opened when using a device that does not incorporate the data flash memory.

Figure 6-10 Data Flash Option Dialog Box



- Opening
- Explanation of Each Area
- Cautions

Opening

Select [Option] menu -> [Data Flash Option...].

Explanation of Each Area

(1) Enable Data Flash Error Emulation

If this item is selected, data flash error emulation function is enabled.

This enables setting of (2) Writing Time Emulation and (3) EEPROM Library Error Emulation.

This item is not selected by default.

(2) Writing Time Emulation

These items specify the time for writing to and erasing the data flash memory.

Select the write time (Writing Time:) and erase time (Erasing Time:) from the following.

Min	No retry
Typ	Typical number of times that is assumed by flash macro specifications (default)
Typ-worst	Maximum number of times that is assumed by flash macro specifications
Max	Retries for the maximum times specified

(3) EEPROM Library Error Emulation

These items set the operation of the EEPROM library function.

When this checkbox is selected, the error value that are not returned in normal emulation can forcibly be returned.

An address in the data flash memory, at which a certain error is to be generated, can be specified by selecting the corresponding checkboxes.

The settable items are as follows: All items are not selected by default.

Generate WordWrite Error	Returns error values in WordWrite functions.
Generate BlockErase Error	Returns error values in BlockErase functions.
Generate BlockIVerify Error	Returns error values in BlockIVerify functions.
Generate BlockBlankCheck Error	Returns error values in BlockBlankCheck functions.

(4) Function buttons

OK	Validates the settings and closes this dialog box.
Cancel	Closes this dialog box.
Restore	Restores the previous settings before this dialog box was opened.
Help	Displays this dialog box online help files.

Cautions

(1) The Data Flash Option dialog box cannot be opened if the "Use Data Flash" checkbox is not selected in the Configuration Dialog Box.

(2) The Data Flash Option dialog box is made unavailable if the "Use Data Flash" checkbox is cleared after the "Enable Data Flash Error Emulation" checkbox is selected in the Configuration Dialog Box.

(3) If an RRM area is set to the data flash memory in the RRM Setting Dialog Box, the written values are not reflected during user program execution because writing to the data flash memory is always performed via the library. Due to the same reason, the written values are not reflected to highlighting of addresses by the access monitor function (Read/Write, Read and Write) in the Memory Window.

(4) Writing to the data flash memory via the DMM Dialog Box is disabled during user program execution.

(5) An unexpected break may occur if a data flash area is accessed via a library when using IECUBE. To prevent this, clear the Non Map check box for Internal RAM and Non Map, Read, and Write check boxes for I/O register in the Fail-safe Break Dialog Box.

(6) If a target memory is mapped to a 1 MB area that includes a data flash area and write-access is performed for the data flash area, no guard breaks occur.

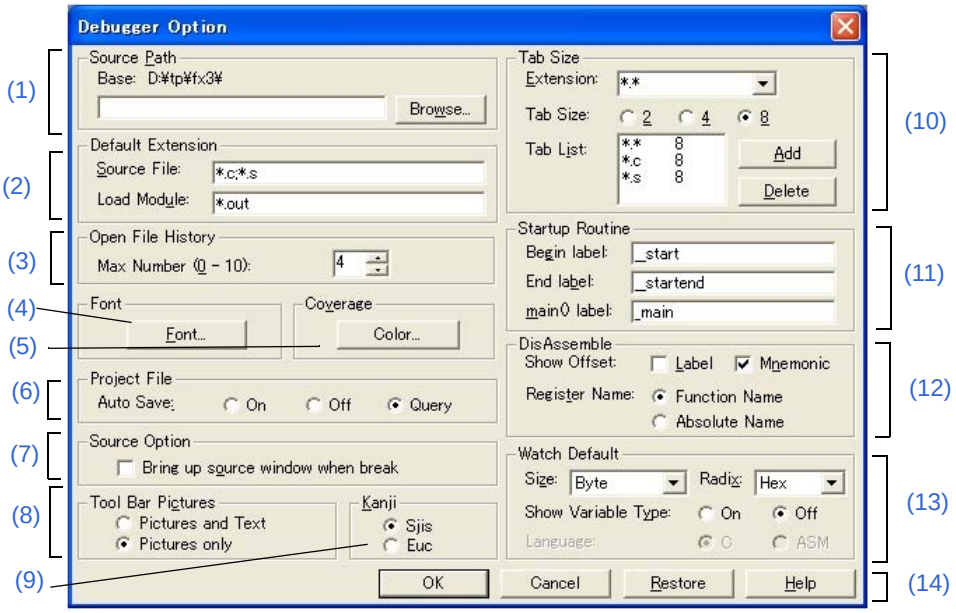
(7) If no target memory is mapped to a 1 MB area that includes a data flash area and read-access is performed for the 1 MB area other than the data flash area, no guard breaks occur.

(8) No software breaks can be set to the data flash area.

Debugger Option Dialog Box

This dialog box is used to display and set the various options of the ID850QB.

Figure 6-11 Debugger Option Dialog Box



- Opening
- Explanation of Each Area

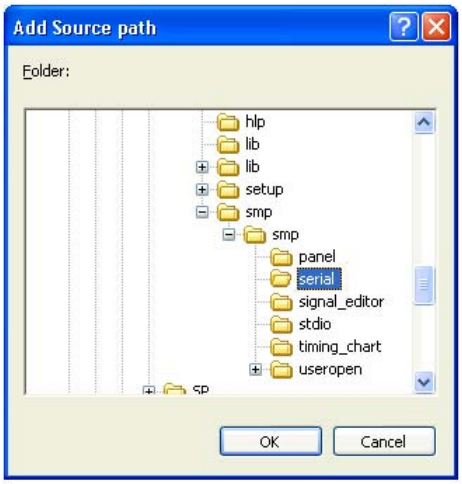
Opening

Select [Option] menu -> [Debugger Option...].

Explanation of Each Area

(1) Source Path

This area is used to specify the directory in which a source file or text file is searched.

Base:	The directory is the basis of a relative path is displayed. The base directory is determined in the following sequence: **1)** Directory to which the project file has been loaded **2)** Directory to which a load module or hex file has been loaded last **3)** Current directory of Windows
Text box	This area is used to specify the directory searched. To specify a directory, either directly input one to the text box, or click the <Browse...> button. A relative path can also be specified. Opens the [Add Source path] Dialog Box by clicking the <Browse...> button. To delimit paths, use ";" (semicolon) or "," (comma). Figure 6-12 [Add Source path] Dialog Box 

Remark1: Directories that contain ";" and/or "," in the source path can be specified. Non-existent directories cannot be specified.

Remark2: Immediately after this dialog box has been opened, the base directory is selected and opened. If the selected directory has already been set for the source path, a source path is not added.

Remark3: Up to 8,191 characters can be set for the source path length in total, including a dot (.) before extension.

If more than 8,191 characters are used to specify a source path, the valid paths until the 8,191th character are set as a source path and characters that follow are ignored.

(2) Default Extension

This area is used to specify the default extension.

Delimit extensions with " " (blank),";" (semicolon) or "," (comma).

Source File:	Set the extension of a source file that is displayed when the Browse Dialog Box is opened by selecting [File] menu -> [Open...]. The default extension is " *.c, *.s".
Load Module:	Set the extension of a load module that is displayed when the Download Dialog Box is opened. The default extension is " *.out".

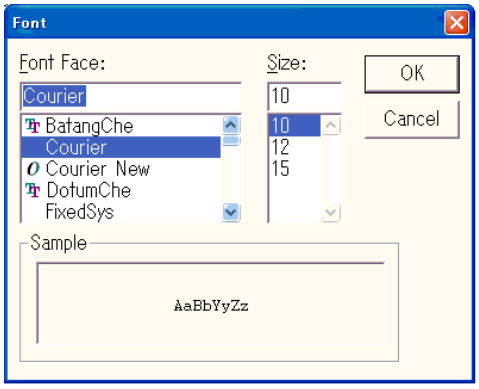
(3) Open File History

This area is used to set the number of histories of the open file displayed in the bottom field of the [File] menu. The default value is 4. If 0 is set, no history is displayed on the menu.

(4) Font

This area is used to specify the font displayed on the Source Window, Watch Window, Quick Watch Dialog Box, Local Variable Window, and Stack Window. Clicking the <Font...> button opens the Font Dialog Box in which the font to be displayed and its size can be set.

Figure 6-13 [Font] Dialog Box



(5) Coverage

The color to distinguish the coverage of executed code, displayed in the Source Window and Assemble Window, can be changed in the Coverage-Color Dialog Box, which is opened by clicking the <Color...> button.

(6) Project File

This area is used to set automatic saving of the project file. (Refer to "5.15.1 Debugging environment (project file)".)

Auto Save:	Sets whether the project file is automatically saved at the ID850QB termination.	
	On	Automatically saves the project file.
	Off	Does not Automatically saves the project file.
	Query	Displays the Exit Debugger Dialog Box at the ID850QB termination. (default)

(7) Source Option

This area is used to set the Source Window operation at a break.

By selecting this checkbox, a Source Window that is active at a break is displayed at the front.

If there is no active Source Window or no debug information in the load module file, the active Assemble Window is displayed at the front.

(8) Tool Bar Pictures

This area sets the buttons to be displayed on the toolbar. (Refer to "(2) Operation of tool bar".)

Pictures and Text	Displays a button on which a graphic and character are displayed.
Pictures only	Displays a button with only graphic. (default)

(9) Kanji

Cannot be selected in this area.

(10) Tab Size

This area is used to set the tab size for each extension when files are displayed.

Extension:	Set an extension. Input an extension from the keyboard, or select one from the drop-down list.
Tab Size:	Select the tab size. Select how many spaces are displayed as a tab code (2, 4, or 8).
Tab List:	Displays the tab size set for each extension.
<Add>	To change the tab size setting, select "Extension:" and "Tab Size:", and click this button.
<Delete>	To delete the tab size setting, select the setting from "Tab List:" and click this button.

(11) Startup Routine

This area is used to specify the first address , end address, and display start symbol of the text area (code area) of the start-up routine by symbols.

By specifying these items, a source file can be opened immediately after the load module format object file is downloaded in the Download Dialog Box. (If the PC locates the address between "Begin label:" and "End label:" at this time, the ID850QB displays the code starting from the address specified in "main() label:").

Begin label:	Specifies the symbol of the first address (default: _start)
End label:	Specifies the symbol of the end address (default: _startend)
main() label:	Specifies the display start symbol (default _main)

Caution1: If the specified symbol is not correct, the source file cannot be opened until the PC reaches the address range of the corresponding source file. In addition, the start-up routine cannot be skipped by step execution.

Caution2: Be sure to specify this area. If this area is blank, the dialog box cannot be closed.

(12) DisAssemble

This area is used to set for disassemble display.

Show Offset:	Specifies whether an offset (symbol + offset) is displayed during disassemble display. When the offset is not displayed, only a symbol that matches a numeric value is displayed, if any. If no matching symbol is found, the numeric value is displayed as a hexadecimal number unchanged.	
	Label	Specifies whether the offset is displayed in the Label field. In the default condition, the offset is not displayed.
	Mnemonic	Specifies whether the offset is displayed in the Mnemonic field. In the default condition, the offset is displayed.
Register Name:	This area is used to select the method of displaying register names in mnemonics during disassemble display.	
	Function Name	Displays register names as function names or nicknames. (default)
	Absolute Name	Displays register names as absolute names.

(13) Watch Default

This area is used to specify a symbol to be watched in the Watch Window etc..

Size:	Selects the default display size of data if [Adaptive] is specified from the drop-down list.	
Radix:	Sets the default radix in which data is to be displayed if [Proper] is specified from the drop-down list. The item selected from this list is also reflected in the subscript for watch data such as array variables (or labels) in the Watch Window (hexadecimal by default), which are registered in the Watch Window after this setting is changed.	
	Hex	Displays in hexadecimal numbers. (default)
	Dec	Displays in decimal numbers.
	Oct	Displays in octal numbers.
	Bin	Displays in binary numbers.
	String	Displays as a character string.
Show Variable Type:	Select the display/non-display of variable type is specified.	
	On	Displays the type of a variable.
	Off	Does not display the type of a variable. (default)
Language:	Select the display/non-display of type of variable is specified.	
	C	Displays a C-like base number.(default).
	ASM	Cannot be selected.

(14) Function buttons

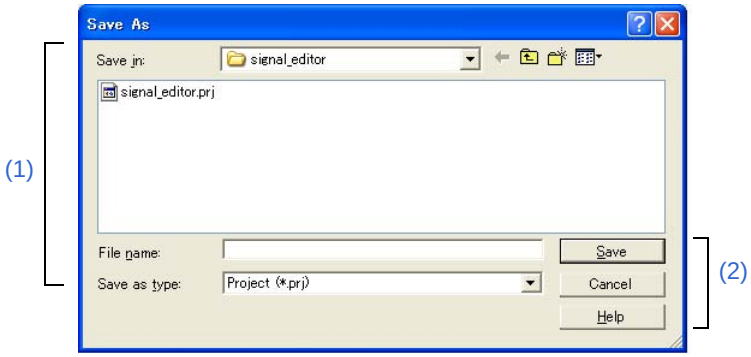
OK	Validates the settings and closes this dialog box.
Cancel	Cancels the changings and closes this dialog box.
Restore	Restores the previous settings before this dialog box was opened.
Help	Displays this dialog box online help files.

Project File Save Dialog Box

This dialog box is used to save the current debugging environment to a project file. (Refer to "5.15.1 Debugging environment (project file)".)

Project files can be newly saved or saved under an existing file name in this dialog box.

Figure 6-14 Project File Save Dialog Box



- Opening
- Explanation of Each Area

Opening

Select [File] menu -> [Project] -> [Save As...].

(To save a file of same name as a project file previously loaded or saved, select [File] menu -> [Project] -> [Save].)

Explanation of Each Area

(1) Save file setting area

Save in:	This area is used to specify a file name. A file name can be directly input, or selected from the list at the upper part of this area. Up to 257 characters string with a extension can be specified.
File name:	
Save as type:	This area is used to specify the extension (*.prj) of the project file to be saved. If the extension is omitted, "*.prj" is appended as the default extension.

(2) Function buttons

Save	Saves the debugging environment to the selected file. After saving, the dialog box is closed.
Cancel	Closes this dialog box without saving the file.
Help	Displays this dialog box online help files.

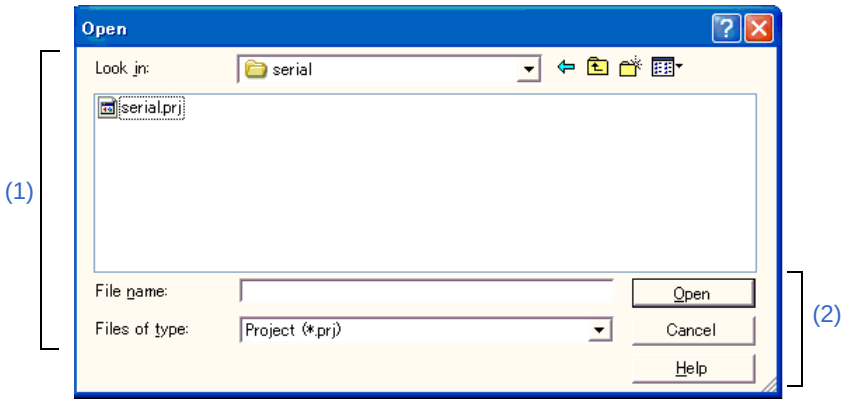
Project File Load Dialog Box

This dialog box is used to restore the debugging environment to the debugging environment saved to the project file. (Refer to "5.15.1 Debugging environment (project file)".)

If there is an active Source Window after a project file has been loaded, it is displayed at the top.

Caution: Following the ID850QB startup, if a project file with settings that differ from those of the target device at startup has been loaded, the target device specified at startup is used.

Figure 6-15 Project File Load Dialog Box



- Opening
- Explanation of Each Area

Opening

Click the **Proj** button, or select [File] menu -> [Project] -> [Open...].

Explanation of Each Area

(1) Load file setting area

Look in:	This area is used to specify the file name to be loaded. A file name can be directly input from the keyboard, or selected from the list. Up to 257 characters string with a extension can be specified.
File name:	
Files of type:	This area is used to specify the extension (*.prj) of the file to be loaded.

(2) Function buttons

Open	Loads the selected file. After loading the file, this dialog box is closed.
Cancel	Closes this dialog box without executing anything.
Help	Displays this dialog box online help files.

Download Dialog Box

This dialog box is used to select the name and format of a file to be downloaded, and downloads memory contents to the in-circuit emulator and the target system. (Refer to "5.2 Download Function, Upload Function".)

If a load module file has been downloaded, the corresponding source file is searched, and the Source Window is automatically opened.

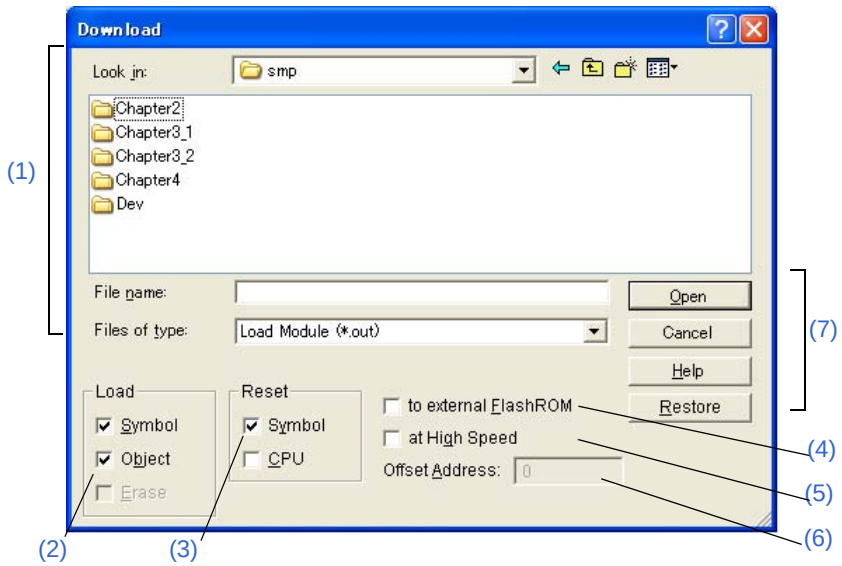
Caution: If a file other than a load module file is loaded, source debugging cannot be executed.

Remark1: The internal flash memory can be written and the load module can be downloaded (refer to "5.7.4 Flash memory writing function [MINICUBE] [MINICUBE2]"). **[MINICUBE] [MINICUBE2]**

Remark2: Files can be downloaded to the external flash memory (refer to "5.2.2 Downloading to External Flash Memory").

Remark3: The following dialog box appears while downloading and the downloading can be can celled at any time.

Figure 6-16 Download Dialog Box



- Opening
- Explanation of Each Area

Opening

Click the **Load** button, or select [File] menu -> [Download...].

Explanation of Each Area

(1) Load file setting area

Look in: File name:	This area is used to specify the file name to be loaded. A file name can be directly input from the keyboard, or selected from the list. Up to 257 characters string with a extension can be specified.
Files of type:	This area is used to specify the extension (*.prj) of the file to be loaded. (Refer to "Table 5-3 Type of File That Can Be Downloaded".) These are default extensions; other extensions can also be used. The default extension of the displayed load module can also be specified in the Debugger Option Dialog Box.

Remark: Two or more files can be specified in this dialog box. To specify two or more files, delimit each file name with " " (double quotation mark). Files can also be specified by clicking the mouse button while holding down the Shift or Ctrl key.

Up to 20 load module files can be downloaded.

(2) Load

Sets a load condition.

This setting is valid only if a file in the load module format is specified.

Symbol	Specifies whether symbol information is read or not.**Note**
Object	Specifies whether object information is read (when selected, default) or not. (The object information is read even if this button is not selected when a HEX file is loaded.)
Erase	Cannot be selected. **[IECUBE]** Specifies whether the contents of the internal flash memory are erased all before download or not. **[MINICUBE]**

Note: The memory capacity can be saved by not reading symbol information when a program consisting of two or more load module files is to be debugged and if the symbol information of some modules does not have to be read.

(3) Reset

Sets a reset condition.This setting is valid only if a file in the load module format is specified (CPU reset is enabled for files other than coverage result files, however.).

Symbol	Specifies whether to reset symbol information while loading a file.**Note**
CPU	Specifies whether to reset the CPU while loading a file. (Not selected, default.)

Note: When downloading two or more load module files, take care that location addresses do not overlap.

(4) to external FlashROM

If the addresses of the internal instruction RAM and those of the flash memory in the external space overlap (this applies to the V850E2 core), specify which takes precedence for downloading.

If this area is checked, the flash memory in the external space takes precedence.

This area is not checked, by default, and therefore, the internal instruction RAM takes precedence.

Note that, before downloading data to the flash memory in the external space, flash information must be set by using the efconfig command on the console window (refer to "5.2.2 Downloading to External Flash Memory", "CHAPTER 7 COMMAND REFERENCE").

(5) at High Speed

This check box is used to select whether to perform high-speed downloading.

If this check box is selected, the clock is switched to the highest one during downloading. (CPU reset occurs when switching the clock.)

It is not selected by default (normal clock is used for downloading).

The target areas are the internal ROM and internal RAM (including VSB ROM and VSB RAM).

An error message will be displayed if the object file includes the code regarding the external memory area, emulation memory area or data flash area.

Remark: Downloading of the coverage result is not subject to high-speed downloading.

(6) Offset Address:

This area is used to specify the offset address that is used when a file is loaded (for binary data, specify the start address). An address can be also specified by a symbol or expression. (Refer to "Table 5-6 Specifying Symbols".) The default radix for inputting a numeric value is hexadecimal.

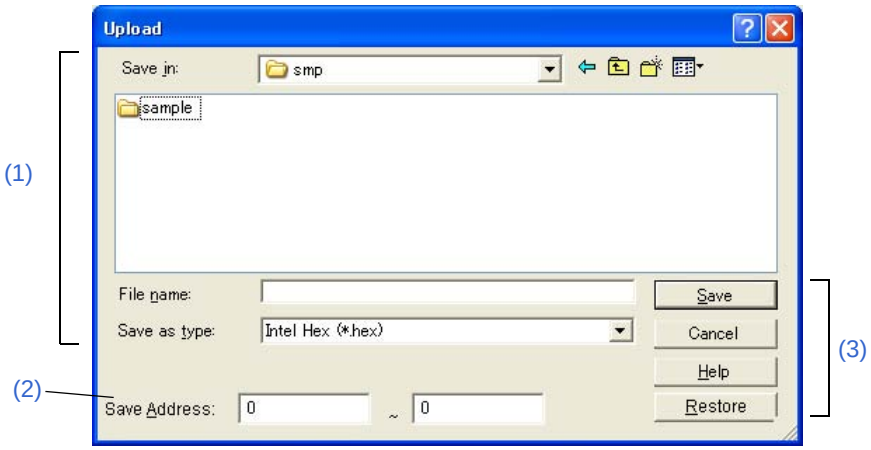
(7) Function buttons

Open	Loads the selected file. After loading the file, this dialog box is closed.
Cancel	Closes this dialog box without loading the file.
Help	Displays this dialog box online help files.
Restore	Restores the input data to the original status.

Upload Dialog Box

This dialog box is used to set the name and format of the file to be saved, and save the set memory contents, etc., to that file. (Refer to "5.2 Download Function, Upload Function".)

Figure 6-17 Upload Dialog Box



- Opening
- Explanation of Each Area

Opening

Select [File] menu -> [Upload...].

Explanation of Each Area

(1) Upload file setting area

Save in:	This area is used to specify a file name. A file name can be directly input, or selected from the list at the upper part of this area. Up to 257 characters string with a extension can be specified.
File name:	
Save as type:	This area is used to specify the extension of the file to be saved.The format of the data to be saved is determined by the extension. (Refer to "Table 5-4 Type of File That Can Be Uploaded".)

Remark: Extensions other than those listed can also be used.

(2) Save Address:

This area is used to specify the range of address to be saved.

All the ranges are saved (this area cannot be set) when coverage data (*.cvb) is selected.

An address can be also specified by a symbol or expression. (Refer to "Table 5-6 Specifying Symbols".) The default radix for inputting a numeric value is hexadecimal.

(3) Function buttons

Save	Saves the file according to the setting.
Cancel	Closes this dialog box without executing anything.
Help	Displays this dialog box online help files.
Restore	Restores the status before this dialog box was opened.

Load Module List Dialog Box

This dialog box displays the list of the files, file paths and file format that have been downloaded from Download Dialog Box. (Refer to "5.2 Download Function, Upload Function".)

The listed files (excluding the coverage data files) are saved in the project file; they are downloaded when the project file is opened next. By using the <Download...> button, the Download Dialog Box can be opened and a file can be downloaded.

Figure 6-18 Load Module List Dialog Box

- Opening
- Explanation of Each Area

Opening

Select [File] menu -> [Load Module...].

Explanation of Each Area

(1) Load module file display area

Module list	This area displays the names of the files that have already been downloaded.		
	No.	The numbers displayed indicate the sequence in which the load module file names were read.	
	Format	The file formats are displayed	
		BIN	Binary file
		HEX	Hex file
		HEX/IDTAG	Hex file with ID tag
		COV	Coverage data file
		ELF/CA850	Load module file (ELF/CA850)
		ELF/DWARF2	Load module file (ELF/GHS extended DWARF2)
		ELF	ELF load module file (ELF without symbol information)
		unknown	Unknown
	File name	The file names are displayed with the full path if "Add Path" is selected; otherwise, only the file names will be displayed.	
Add Path	This should be selected to specify file names are displayed with the path.		
<Download...>	Opens the Download Dialog Box. A new load module can be downloaded. The file name of the newly file will be added to the file name display area when the Download dialog box is closed.		

Caution: If symbol information has been reset in the Reset Debugger Dialog Box, or if symbol information has been reset in the Download Dialog Box, the file names downloaded before that are cleared.

(2) Function buttons

Close	Closes this dialog box.
Help	Displays this dialog box online help files.

Source Window

This window is used to displays source files or text files. (Refer to "5.3 Source Display, Disassemble Display Function".) In addition to Breakpoint setting , Display of locations for which coverage measurement is executed and Mixed display mode (Source Window), a number of other operations using Context Menu, Function buttons, etc., can be performed in this window. Moreover, there are two statuses, Active status and static status, for this window. When the window is in the active status, it has the Trace result with linking window [IECUBE]. Moreover, the items selected in the window with Drag & drop function can be used in another window. (Refer to "5.16 Functions Common to Each Window".)

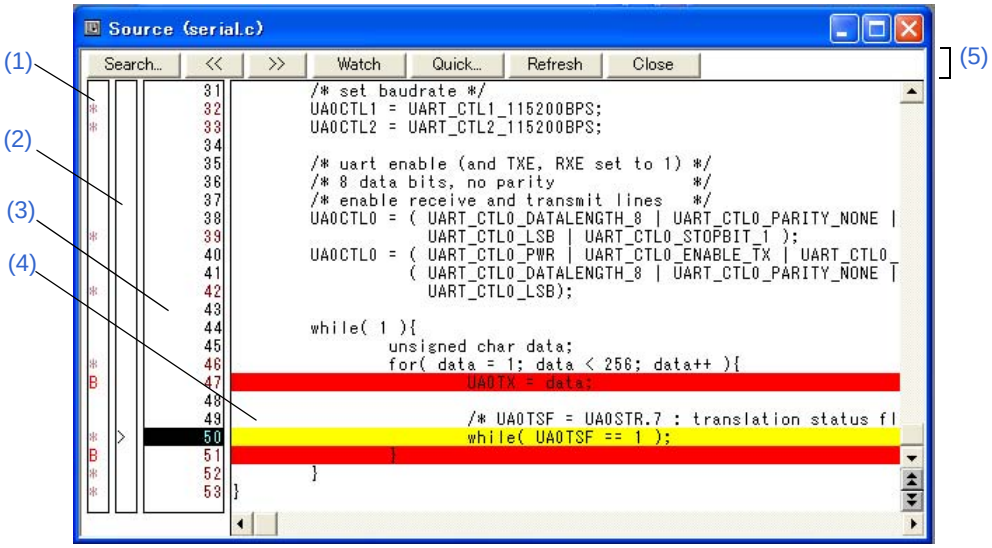
Caution1: If program codes is described in an include file and these codes are included in multiple files, the line numbers and addresses do not correspond on a one-to-one bases. In such an include file, function that indicates the correspondence relationship between line numbers and addresses dose not correctly operate.

Caution2: If a source file that includes the "main" function cannot be found in the source path after a load module file is downloaded, or if the source file cannot be found during step execution, ID850QB opens a dialog box to select the source file and prompt the user to select the source path for the source file displayed in the dialog box. If the <Cancel> button is clicked, the displayed file name is memorized, so the source file name will no longer be asked, until ID850QB is terminated.

Remark1: Up to 65,535 lines of C and assembly language source files can be displayed. If the source files exceed 65,535 lines, partition them.

Remark2: The number of characters that can be displayed on 1 line in each area of a window is 319.

Figure 6-19 Source Window



- Opening
- Explanation of Each Area
- [View] Menu (Source Window-dedicated items)
- Context Menu

Opening

 Click the **Src** button, or select [Browse] menu -> [Source Text].

(This window is automatically opened if the corresponding source file exists after the download module file has been downloaded.)

Explanation of Each Area

(1) Point mark area

This area is used for the Event Setting Status (Event Mark) and program codes (*) display, as well as Breakpoint setting.

Breakpoints can be set or deleted by clicking with the mouse on this program code.

(if "*" is not displayed for the line, the breakpoint is set on the line above or below the line, whichever has "*" displayed.)

The program code is displayed only when the symbol information downloaded by the load module file is read.

If an event has been set for the corresponding line, one of the marks listed in the following table is displayed. The color of the "B" mark differs according to the breakpoint type and status. (When a breakpoint is set in this area, it is enabled at the same time that it is set.)

Table 6-13 Event Setting Status (Event Mark)

Mark	Meaning
B (blue)	Software breakpoint is set.
B (red)	Valid hardware breakpoint (after execution) is set.
B (green)	Valid hardware breakpoint (before execution) is set. **Note**: Breaks before execution are set with priority.
B (black)	Invalid hardware breakpoint is set. This hardware breakpoint can be validated on the Event Manager or in the Break Dialog Box.
E	Event condition is set.
L	Event link condition is set.
T	Trace event is set.
Ti	Timer event is set.
A	Multiple events are set.

Remark: If an address range is specified as the address condition of the event, the lower addresses of the range are displayed. The mask specification of the address condition is not reflected.

(2) Current PC mark area

The mark ">", which indicates the current PC value (PC register value), is displayed in this area.

Clicking this mark with the mouse displays a pop-up window that shows the PC register value.

By double-clicking the current PC mark area, the program can be executed up to a specified line. (Refer to "[Come Here]".)

(3) Line number/address display area

This area displays the line numbers of a source file or text file.

Red indicates line numbers for which corresponding program code exists, and black indicates line numbers for which corresponding program code does not exist. In the Mixed display mode (Source Window), disassemble display addresses are displayed in gray.

In addition, executed addresses are highlighted based on code coverage measurement information. (Refer to "5.11.3 Display of locations for which coverage measurement is executed".)

(4) Source text display area

This area displays the line numbers of a source file or text file.The following line is emphasized.

Current PC line ((yellow)[Note]	**Yellow** indicates the current PC line (or disassemble line)('>'). If there is no line number information at the PC position when a break occurs, the execution automatically jumps to the Assemble Window. In the Mixed display mode (Source Window), the color of only the disassemble display line is changed (the source line is displayed in the normal color).
Break point setting line (red)	**Red** indicates lines where a valid breakpoint is set. In the Mixed display mode (Source Window), the color of only the disassemble display line is changed (the source line is displayed in the normal color).

Moreover, this area also provides the following functions for lines (start address of program code) and addresses where the cursor has been placed.

- [Come Here], [Start From Here] (Refer to "Table 5-9 Type of Execution".)
- Drag & drop function
- Context Menu

Caution: If a Program code does not exist on the source line, the top address of the line above or below the line on which a program code exists is manipulated by these functions.

These functions cannot be performed in the following cases. The corresponding menu will be dimmed and cannot be selected.

- If a file other than a source file is displayed
- While the user program is being executed

(5) Function buttons

Search...	Opens the Source Search Dialog Box and searches a character string of the source text. If a character string is selected in the source text display area, the Source Search Dialog Box is opened to search the character string. If no character string is selected, the Source Search Dialog Box is opened with nothing specified to be searched. Specify a search method in the Source Search Dialog Box. The results of search is highlighted in the Source window. This is the same operation as selecting [View] menu -> [Search...].
<<	Searches forward (upward on screen) for the text that satisfies the search condition set in the Source Search Dialog Box, starting from the address at the cursor position. This button is displayed as the <Stop> button during a search.
>>	Searches backward (downward on screen) for the text that satisfies the search condition set in the Source Search Dialog Box, starting from the address at the cursor position. This button is displayed as the <Stop> button during a search.
Stop (during a search)	Stops searching.
Watch	Adds the variables selected in the source text display area to the Watch Window. If the Watch Window is not opened, it is opened. If no text is selected in the source text display area, the Watch Window is only opened. This is the same operation as selecting [View] menu -> [View Watch].
Quick...	Temporarily displays the contents, such as a variable, selected in the source text display area in the Quick Watch Dialog Box. If no text is selected in the source text display area, the Quick Watch Dialog Box is only opened. This is the same operation as selecting [View] menu -> [Quick Watch...].
Refresh	Updates the contents of the window with the latest data.
Close	Closes this window.

[View] Menu (Source Window-dedicated items)

The following items are added in the [View] menu, when the Source Window is active.

Create Break Event	Sets a break event that occurs if the selected variable is accessed.
Break when Access to this Variable	Sets a break event that occurs if the selected variable is accessed for read/write.
Break when Write to this Variable	Sets a break event that occurs if the selected variable is accessed for write.
Break when Read from this Variable	Sets a break event that occurs if the selected variable is accessed for read.
Clear	Deletes a break event corresponding to the selected variable.
Event Information	Displays the event information of a line at the cursor position or a selected variable name. If an event is set, the Event Dialog Box is opened.
Mix	Turns on/off Mixed display mode (Source Window).

Context Menu

Move...	Moves the display position. Opens the Source Text Move Dialog Box.
Mix	Turns on/off Mixed display mode (Source Window).
Add Watch...	Adds the specified data to the Watch Window. Opens the Add Watch Dialog Box.
Symbol...	Displays the address of the specified variable or function, or the value of the specified symbol. Opens the Symbol To Address Dialog Box.
Break when Access to this Variable	Sets a break event that occurs if the selected variable is accessed for read/ write.
Break when Write to this Variable	Sets a break event that occurs if the selected variable is accessed for write.
Break when Read from this Variable	Sets a break event that occurs if the selected variable is accessed for read.
Clear	Deletes a break event corresponding to the selected variable.
Event Information	Displays the event information of a line at the cursor position or a selected variable name. If an event is set, the Event Dialog Box is opened.
Come Here	Executes the program from the current PC to the cursor position. (Refer to "Table 5-7 Break Types".)
Change PC	Sets the address at the cursor position to the PC.
Break Point	Sets or deletes a hardware breakpoint at the cursor position. **Note:** Breaks before execution (B) are set with priority.
Software Break Point	Sets or deletes a software breakpoint at the cursor position.

Assemble	Disassembles and displays starting from the jump destination address specified by the data value at the cursor position. (Refer to "5.16.2 Jump function".) Opens the Assemble Window. If an active Assemble Window is open, that window is displayed in the forefront (so that it can be manipulated).
Memory	Displays the memory contents starting from the jump destination address specified by the data value at the cursor position. (Refer to "5.16.2 Jump function".) Opens the Memory Window. If an active Memory Window is open, that window is displayed in the forefront (so that it can be manipulated).

Source Search Dialog Box

This dialog box is used to search the contents of a file in the Source Window. (Refer to "5.3.1 Source display".)

By setting each item and then clicking the <Find Next> button, searching can be started. By clicking the <Set Find> button, the direction buttons ("<<" and ">>") in the Source Window can be used for the search.

Remark: The maximum length of the character string that can be searched for in the Source Window is 150 (ANK characters).

Figure 6-20 Source Search Dialog Box

- Opening
- Explanation of Each Area

Opening

When the Source Window is the current window, select [View] menu -> [Search...], or click the <Search...> button in the same window.

Explanation of Each Area

(1) Search conditon specification area

Find What:	This area is used to specify the data to be searched. (Up to 256 characters.) In the default condition, the string selected in the window that called this dialog box is displayed. As necessary, the character string displayed can be changed. Up to 16 input histories can be recorded.	
Match Case	This should be selected to distinguish between uppercase and lowercase.	
Direction	This area is used to specify the direction of the search.	
	Up	Forward search. Searches data forward (upward on screen) from the current position of the cursor.
	Down	Backward search. Searches data backward (downward on screen) from the current position of the cursor. (default)

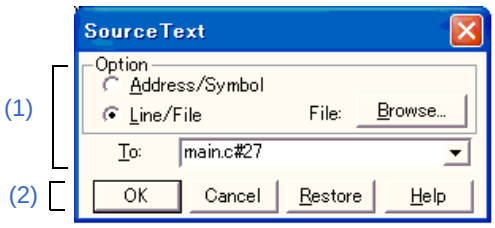
(2) Function buttons

Find Next	Searches the specified data in accordance with a given condition.If the specified character string is found as a result of a search, it is highlighted. To continue searching, click this button again.
Set Find	Sets the specified condition as the search condition and closes this dialog box.
Stop (during searching)	Stops searching.
Close	Closes this dialog box. (During searching, this button is replaced by the <Stop> button.)
Help	Displays this dialog box online help files.

Source Text Move Dialog Box

This dialog box is used to specify a file to be displayed in the Source Window and the position from which displaying the file is to be started. (Refer to "5.3.1 Source display".)

Figure 6-21 Source Text Move Dialog Box



- Opening
- Explanation of Each Area
- Source path search order

Opening

When the Source Window is the current window, select [View] menu -> [Move...].

Explanation of Each Area

(1) Source file setting area

Option	Selects the input mode when the display start position is specified.	
	Address/Symbol	This should be selected to specify by an address (or symbol).
	Line/File	This should be selected to specify by a line number (or file name). To search the file name, use the <Browse...> button.

To:	Specifies the file name or address to be displayed. Up to 16 input histories can be recorded.	
	When "Address/ Symbol" is selected	Specifies the address from which display is to be started. The default radix for inputting a numeric value is hexadecimal. An address can be also specified by a symbol or a expression. (Refer to "Table 5-6 Specifying Symbols".) Clicking the <OK> button displays the source text so that the source line corresponding to the specified address value can be viewed.
	When "Line/File" is selected	Specifies the line number (or a file name) from which display is to be started. The line number is specified by **[[path name] file name]# line number**. The default radix for inputting a numeric value is decimal. The file name can be specified just bythe file name, or using the absolute path and relative path. If just the file name or the relative path was specified, the file in the source path specified in the Debugger Option Dialog Box is searched. The file whose specified line number was specified as the first line is displayed by clicking the <OK> button. When the file name is omitted, the currently displayed file is displayed from the specified line. If the line number is omitted, the file is displayed from the first line.

(2) Function buttons

OK	Starts displaying the source text from the specified position.
Cancel	Closes this dialog box.
Restore	Restores the status before this dialog box was opened.
Help	Displays this dialog box online help files.

Source path search order

The debugger searches source files in the following order and displays the file that has been found first (automatic source path setting).

(1) Folder where source file is placed when it is built

(2) Source path passed from project manager PM+ or source path set on Debugger Option Dialog Box

(3) Folder where load module file exists

The user does not need to specify the source path if the source files are stored in the folder where they were placed during build by project manager PM+. If no source files are found even if they are searched for in the above order, a dialog box that prompts the user to specify the source path will be displayed.

Assemble Window

This window is used to disassemble and display programs. It is also used to execute Line assembly. (Refer to "5.3 Source Display, Disassemble Display Function".) The results of line assembly are also reflected in the Memory Window.

In addition to Breakpoint setting and Display of locations for which coverage measurement is executed, a number of other operations using Context Menu, Function buttons, etc., can be performed in this window. Moreover, there are two statuses, Active status and static status, for this window. When the window is in the active status, it has the Trace result with linking window [IECUBE]. Moreover, the items selected in the window with the Drag & drop function can be used in another window. (Refer to "5.16 Functions Common to Each Window".)

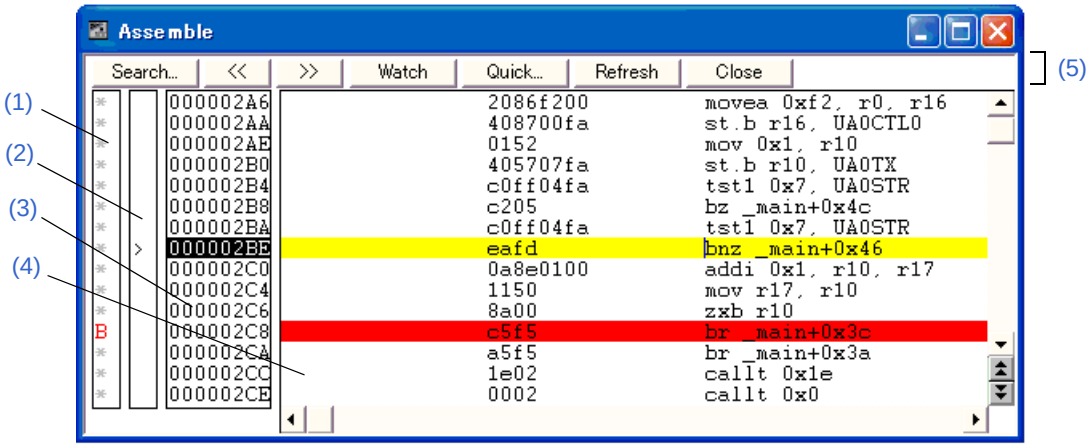
Caution1: Peripheral I/O registers with the same address but different names cannot be distinguished in the disassemble display.

Caution2: Illegal mnemonics may be displayed if the Assemble window is scrolled up (toward the direction in which the addresses are decremented).

Caution3: The maximum length of the character string that can be searched for in the Assemble window is 150 (ANK).

Caution4: Line assemble in the Assemble window does not optimize instructions, as is performed in the CA850 assembler

Figure 6-22 Assemble Window



- Opening
- Explanation of Each Area
- [View] Menu (Assemble Window-dedicated items)
- Context Menu
- Related Operations

Opening

 Click the **Asm** button, or select [Browse] menu -> [Assemble].

Explanation of Each Area

(1) Point mark area

This area is used for Event Setting Status (Event Mark) and Breakpoint setting.

(2) Current PC mark area

The mark ">", which indicates the current PC value (PC register value), is displayed in this area.

By double-clicking the current PC mark area, the program can be executed up to a specified line. (Refer to "[Come Here]".)

(3) Address specification area

This area displays the disassembly start address.

In addition, executed addresses are highlighted based on code coverage measurement information. (Refer to "5.11.3 Display of locations for which coverage measurement is executed".)

Remark: The end address is not display. The end address is 0xFFFFFFFE.

(4) Disassemble display area

This area displays the labels and code data of addresses, and disassembled mnemonics.

It can be Line assembly in the mnemonic field.

The following line is emphasized.

Current PC line (yellow)	**Yellow** indicates the current PC line ('>').
Break point setting line (red)	**Red** indicates lines where a valid breakpoint is set.

This area also provides the following functions:

- [Come Here], [Start From Here] (Refer to "Table 5-9 Type of Execution".)
- Drag & drop function
- Context Menu

(5) Function buttons

Search...	Opens the Assemble Search Dialog Box and searches for a character string of mnemonics. Specify a search method in the Assemble Search Dialog Box. The results of search is highlighted in the Assemble Window. This is the same operation as selecting [View] menu -> [Search...].
<<	Searches forward (upward on screen) for the contents that satisfy the search condition set in the Assemble Search Dialog Box, starting from the address at the cursor position. This button is displayed as the <Stop> button during a search.
>>	Searches backward (downward on screen) for the contents that satisfy the search condition set in the Assemble Search Dialog Box, starting from the address at the cursor position. This button is displayed as the <Stop> button during a search.
Stop(during a search)	Stops searching.
Watch	Adds the symbols selected in (4) Disassemble display area to the Watch Window. If the Watch Window is not opened, it is opened. If no text is selected in "Disassemble display area", the Watch Window is only opened. This is the same operation as selecting [View] menu -> [View Watch].
Quick...	Temporarily displays the contents, such as symbols, selected in (4) Disassemble display area on the Quick Watch Dialog Box. Opens the Quick Watch Dialog Box. If no text is selected in "Disassemble display area", the Quick Watch Dialog Box is only opened. This is the same operation as selecting [View] menu -> [Quick Watch...].
Refresh	Updates the contents of the window with the latest data.
Close	Closes this window.

[View] Menu (Assemble Window-dedicated items)

The following items are added in the [View] menu, when the Assemble Window is active.

Event Information	Displays the event information of the address at the cursor position. If an event is set, the Event Dialog Box is opened.

Context Menu

The menu items are effective for the selected line or item, not the position where the mouse pointer was clicked (same operation as when selecting the main menu with the same name).

Move...	Moves the display position. Opens the Address Move Dialog Box.
Add Watch...	Adds the specified data to the Watch Window. Opens the Add Watch Dialog Box.
Symbol...	Displays the address of the specified variable or function, or the value of the specified symbol. Opens the Symbol To Address Dialog Box.

Come Here	Executes the program from the current PC to the cursor position. (Refer to "Table 5-7 Break Types".)
Change PC	Sets the address at the cursor position to the PC.
Break Point	Sets or deletes a hardware breakpoint at the cursor position. **Note:** Breaks before execution (B) are set with priority.
Software Break Point	Sets or deletes a software breakpoint at the cursor position.
Source Text	Displays the corresponding source text and source line, using the data value at the cursor position as the jump destination address. (Refer to "5.16.2 Jump function".) If no line information exists at the jump destination address, however, you cannot jump. Opens the Source Window. If an active Source Window is open, that window is displayed in the forefront (so that it can be manipulated).
Memory	Displays the memory contents starting from the jump destination address specified by the data value at the cursor position. (Refer to "5.16.2 Jump function".) Opens the Memory Window. If an active Memory Window is open, that window is displayed in the forefront (so that it can be manipulated).

Related Operations

(1) Line assembly

To change the disassembled contents, move the cursor to the mnemonic field (the overwrite and insertion modes are alternately selected by pressing the Insert key).

If an attempt is made to move the cursor to another line after the disassembled contents have been changed in the mnemonic field, the new contents are checked. If the new contents are illegal, the code data on the line where the contents have been changed is indicated as "*".

The contents changed in the mnemonic field are written into the memory by pressing the Enter key. By pressing the Enter key, the new contents are checked. If even one line is illegal, the new contents are not written into the memory. To discard the contents, press the ESC key.

If the contents are correct and if the Enter key is pressed, the contents are written to the memory, and then the cursor moves to the next line in the mnemonic field, so that the data on the next line can be changed.

Caution: If the number of new instruction bytes is less than the number of previous instruction bytes as a result of changing, as many "nop" instructions as necessary are inserted. If the number of new instruction bytes is more than the number of previous instruction bytes, the next instruction is over-written. In this case also, as many "nop" instructions as necessary are inserted. The same applies to instructions that straddle over source lines.

Assemble Search Dialog Box

This dialog box is used to search the contents in the Assemble Window. (Refer to "5.3.2 Disassemble display".)

Successive character strings included in an input character string and disassembler character string are compared as one blank character.

By setting each item and then clicking the <Find Next> button, searching can be started. By clicking the <Set Find> button, the direction buttons ("<<" and ">>") in the Assemble Window can be used for the search.

Figure 6-23 Assemble Search Dialog Box

- Opening
- Explanation of Each Area

Opening

When the Assemble Window is the current window, select [View] menu -> [Search...], or click the <Search...> button in the same window.

Explanation of Each Area

(1) Search condition specification area

Find What:	This area is used to specify the data to be searched. (Up to 256 characters.) In the default condition, the string selected in the window that called this dialog box is displayed. As necessary, the character string displayed can be changed. Up to 16 input histories can be recorded.	
Match Case	This should be selected to distinguish between uppercase and lowercase.	
Scan Whole Region	This should be selected to search the entire specified range.	
Direction	This area is used to specify the direction of the search.	
	Up	Forward search. Searches data forward (upward on screen) from the current position of the cursor.
	Down	Backward search. Searches data backward (downward on screen) from the current position of the cursor. (default)

Address:	This area is used to specify the address to be searched. The default radix for inputting a numeric value is hexadecimal. An address can be also specified by a symbol or expression. (Refer to "Table 5-6 Specifying Symbols".)

(2) Function buttons

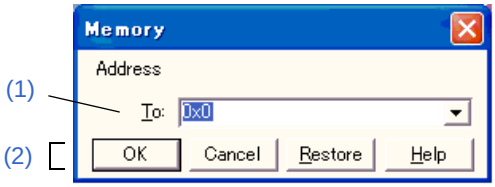
Find Next	Searches the specified data in accordance with a given condition. If the specified character string is found as a result of a search, it is highlighted. To continue searching, click this button again.
Set Find	Sets the specified condition as the search condition and closes this dialog box.
Stop (searching)	Stops searching.
Close	Closes this dialog box. (During searching, this button is replaced by the <Stop> button.)
Help	Displays this dialog box online help files.

Address Move Dialog Box

This dialog box is used to specify the start address from which displaying, as follows.

- Memory Window
- Assemble Window
- IOR Window

Figure 6-24 Address Move Dialog Box (Example: When Memory Window Is Open)



- Opening
- Explanation of Each Area

Opening

When the target window is the current window, select [View] menu -> [Move...].

Explanation of Each Area

(1) Address specification area

Address	This area is used to specify the start address from which displaying.	
	To:	In the default condition, the string selected in the window that called this dialog box, or the current PC value etc. is displayed. As necessary, the character string displayed can be changed. The default radix for inputting a numeric value is hexadecimal. An address can be also specified by a symbol or expression. (Refer to "Table 5-6 Specifying Symbols".) Up to 16 input histories can be recorded.

(2) Function buttons

OK	The corresponding window is displayed from the address.
Cancel	Closes this dialog box.
Restore	Restores the status before this dialog box was opened.
Help	Displays this dialog box online help files.

Symbol To Address Dialog Box

This dialog box is used to display the address of the specified variable or function, or the value of the specified symbol. (Refer to "5.3.4 Convert symbol (symbol to address)".)

Figure 6-25 Symbol To Address Dialog Box

- Opening
- Explanation of Each Area

Opening

Select [View] menu -> [Symbol...].

Explanation of Each Area

(1) Symbol conversion area

Symbol:	This area is used to specify the variable, function name, symbol name, or line number to be converted. (Refer to "Table 5-6 Specifying Symbols".) To change the contents of this area, click the <OK> button. The conversion result will be displayed in the area below. The default radix for inputting a numeric value is decimal. Up to 16 input histories can be recorded.	
Conversion result display area	If bit symbol have been specified, they are converted to the Address.bit format. Also, equations that include bit symbols cannot be specified. The variable, address of the function, value of the symbol, address of the line number, or value of the expression specified in "Symbol:" is displayed. The address value of an I/O port name or peripheral I/O registers name, the register contents of a register name, or flag value of a PSW flag name is displayed.	
Radix:	This area is used to select the radix of the converted data to be displayed.	
	Hex	Hexadecimal number (default)
	Dec	Decimal number
	Oct	Octal number
	Bin	Binary number

(2) Function buttons

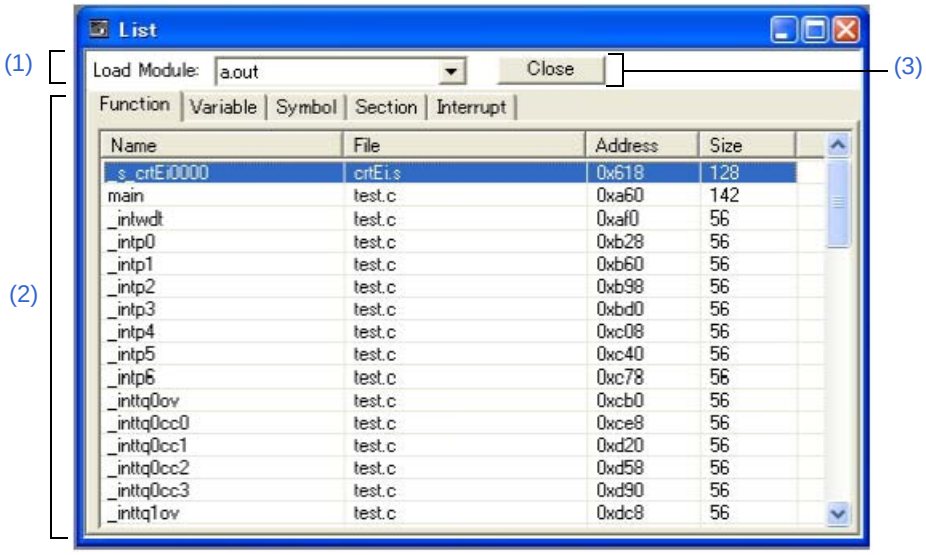
OK	If the contents of "Symbol:" have been changed, converts the symbol. After conversion, closes the dialog box if the contents of "Symbol:" have not been changed.
Close	Closes this dialog box.
Restore	Restores the input data to the original status. If the <OK> button has already been clicked, the data is restored to the status immediately after the <OK> button was clicked.
Help	Displays this dialog box online help files.

List Window

This window lists functions, variables, symbols, sections, and interrupt requests.

Display data can be saved in the CSV format, independently for a selected tab. (Refer to "5.15.2 Window display information (view file)".)

Figure 6-26 List Window



- Opening
- Explanation of Each Area
- Context Menu

Opening

Select [Browse] menu -> [List].

Explanation of Each Area

(1) Load Module:

This area is used to select the load module file that has been downloaded.

This area is blank when no load module file has been downloaded.

(2) List view area

The items such as names, sizes, and addresses of functions, variables, symbols, sections, and interrupt requests are listed, by each tab. The displayed contents are updated automatically after a load module file is downloaded.

This area is blank when no load module file has been downloaded.

(a) When [Function] tab is selected

Name	Function name (displayed as function in file units in case of assembler source file)
File	Name of file in which the function is defined
Address	Function start address
Size	Function size (unit: bytes)

(b) When [Variable] tab is selected

Name	Variable name
File	Name of file in which the variable is defined
Address	Variable start address
Size	Variable size (unit: bytes)

(c) When [Symbol] tab is selected

Name	Symbol name
Address	Symbol address

(d) When [Section] tab is selected

Name	Section name
Type	Section type (code, data)
Address	Section start address
Size	Section size (unit: bytes)

(e) When [Interrupt] tab is selected

Name	Interrupt request name
Type	Interrupt type (nonmaskable, maskable, software, security id, flash mask option)
Status	Utilization status in the program (use, nonuse) ---- : Unknown
Address	Starting address of the interrupt handler
Size	Size of the interrupt handler (unit: bytes) Maximum size for statuses other than "use"

The pointer can also jump to any of the above windows just by double-clicking the jump source address.

The display jumps from this tab to the Source Window, Assemble Window or Memory Window using the start address value of the selected line as a jump pointer. The jump destination window will be displayed from the jump pointer.

The jump function is executed by selecting a jump source line then selecting [Source Text/Assemble/Memory] in the [Jump] menu.

Remark: The displayed items are sorted by clicking the title (on the label) in each column (ascending/ descending order is switched each time the title is clicked).The width of each column can be changed, but the change is lost when the data in the window is saved as the CSV file.

(3) Function buttons

Close	Closes this window.

Context Menu

Source Text	Displays the corresponding source text and source line, using the data value at the cursor position as the jump destination address. (Refer to "5.16.2 Jump function".) If no line information exists at the jump destination address, however, you cannot jump. Opens the Source Window. If an active Source Window is open, that window is displayed in the forefront (so that it can be manipulated).
Assemble	Disassembles and displays starting from the jump destination address specified by the data value at the cursor position. (Refer to "5.16.2 Jump function".) Opens the Assemble Window. If an active Assemble Window is open, that window is displayed in the forefront (so that it can be manipulated).
Memory	Displays the memory contents starting from the jump destination address specified by the data value at the cursor position. (Refer to "5.16.2 Jump function".) Opens the Memory Window. If an active Memory Window is open, that window is displayed in the forefront (so that it can be manipulated).

Watch Window

This window is used to display and change specified watch data. (Refer to "5.6 Watch Function".)

This window can also display wide-ranging watch data (such as global variables and public symbols) in real time even during program execution, in the same way as the Memory Window.

The results of updating and rewriting data in this window will be reflected in the Memory Window.

Watch data is registered by clicking the <Watch...> button in the Source Window or Assemble Window. (Refer to "5.6.3 Registering and deleting watch data".)

This window allows easy setting of breakpoints to variables via a Context Menu.

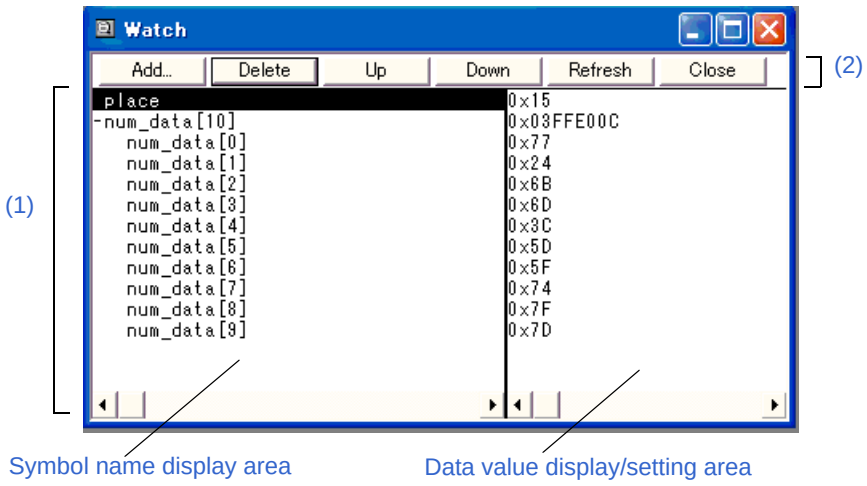
Remark1: If a local variable and a global variable exist with the same name, the local variable takes priority.

Remark2: A maximum of 10,000 lines can be displayed in the Watch Window.

Caution1: If an area that extending over a bank boundary (256 bytes) in the RRM area is accessed during user program execution, the invalid values are displayed for the higher addresses. Consequently, the corresponding variables are highlighted with red in the Watch window. (In such a case, the values displayed in the Memory window are also invalid, but they are not highlighted with red.)
This phenomenon occurs only during user program execution. The correct values are displayed at a break. **[IECUBE]**

Caution2: When a function to assign external variables to the registers of the CA850 is used, the variable cannot be browsed or set in the Watch window. Manipulate such variables in the Register Window or register the relevant register in the Watch window before manipulating the variables.

Figure 6-27 Watch Window



- Opening
- Explanation of Each Area
- [View] Menu (Watch Window-dedicated items)
- Context Menu

Opening

 Click the **Wch** button, or select [Browse] menu -> [Watch].

Explanation of Each Area

(1) Watch data display/change area

The left area displays symbol names, and the right area displays data values.

Symbol name display area	This area is used to display variable names, symbol names and types, and tag names of structures or unions.'+' is prefixed to the displayed arrays, pointer variables, and structures or unions. These variables are expanded and displayed when they are double-clicked (first character changes from "+" to "-"). Registered watch data changes are performed in the Change Watch Dialog Box opened by selecting the item to be changed and then selecting Context Menu -> [Change Watch...]. A line with an expanded hierarchy, such as the elements of an array, and members of structures and unions cannot be deleted. If an access breakpoint is set for a variable or a symbol in the Watch Window, the symbol name display area is highlighted in gold.	
	Array	By double-clicking the "+", all the elements of the variable are displayed in accordance with the type of the array variable.
	Pointer variable	By double-clicking the "+", the data indicated by the pointer is displayed.
	Structure/union	By double-clicking the "+", all the members of the structure/union are displayed in accordance with the type of the member variable. If a structure or union is defined in the structure or union, the structure name or union name of the internal structure or union is also displayed. The internal structure or union can be also expanded by using "+".

<table>
<tr><td>Data value display/setting area</td><td>This area is used to display and change watch data values. A value is updated when execution is stopped. To save a value, select [File] menu -> [Save As...]. This area is blank if getting data has failed.
Values are changed through direct input. The location to be changed is displayed in red and the contents of the change are written into the target memory when the Enter key is pressed. The previous value can be canceled by the ESC key.
<table><tr><th>Display Data</th><th>Contents</th></tr><tr><td>Integer</td><td>Hexadecimal (0xxxxx)
Decimal (xxxx)
Octal (0xxxx)
Binary (0bxxxx)</td></tr><tr><td>Character</td><td>"Character"</td></tr><tr><td>Enumeration type</td><td>Member name</td></tr><tr><td>If scope is specified</td><td>Displayed in accordance with specified scope.</td></tr><tr><td>Floating-point type</td><td>Single precision/double precision supported.
The input/display format is as follows:
[+ | -] inf
[+ | -] nan
[+ | -] integer e [+ | -]exponent
[+ | -] integer.fraction[e [+ | -]exponent</td></tr><tr><td>"?"</td><td>Data that has been invalidated because of a change in the scope or optimized compiling</td></tr></table></td></tr>
</table>

Remark1: If an array has too many variables and takes too long to expand, a warning message is displayed.

Remark2: The radix can be changed per variable using the Context Menu. The display format of integers and the number of elements for arrays can be changed in the Debugger Option Dialog Box.

Remark3: Lines cannot be deleted and radices cannot be changed by selecting multiple lines on the Watch window. Select one line at a time.

(2) Function buttons

Add...	Opens the Add Watch Dialog Box. If watch data is specified and the <Add...> button is clicked in the Add Watch Dialog Box, the specified watch data is added to the Watch Window.
Delete	Deletes the selected watch data from the window.
Up	Moves the selected line one line up.
Down	Moves the selected line one line down.
Refresh	Updates the contents of this window with the latest watch data.
Close	Closes this window.

[View] Menu (Watch Window-dedicated items)

When this window is the current window, The following items are added on [View] menu.

Only the selected item is subject to this manipulation.

Create Break Event	Creates a break event by using the selected item as follows.
Beak when Access to this Variable	Creates a break event that can be accessed for read/write by using the selected item.
Break when Write to this Variable	Creates a break event that can be accessed for write by using the selected item.
Break when Read from this Variable	Creates a break event that can be accessed for read by using the selected item.
Clear	Deletes a break event corresponding to the selected item.
Event Information	Displays the event information of the variable selected. If an event is set, the Event Dialog Box is opened.
Bin	Displays the selected line in binary numbers.
Oct	Displays the selected line in octal numbers.
Dec	Displays the selected line in decimal numbers.
Hex	Displays the selected line in hexadecimal numbers.
String	Displays the selected line as a character string.
Proper	Displays the selected line as the default value of each variable. Symbols are displayed in accordance with the setting of the Debugger Option Dialog Box (default).
Byte	Displays the selected line in 8-bit units.
Half Word	Displays the selected line in 16-bit units.
Word	Displays the selected line in 32-bit units.
Adaptive	Displays the selected line as the default value of each variable. (default) Only this item is valid for a symbol in C language. Symbols in assembly language are displayed in accordance with the setting of the Debugger Option Dialog Box.
Up	Moves the selected line one line up.
Down	Moves the selected line one line down.
Compulsion Read	Forcibly reads IOR, that are disabled from being read because their values will be changed, or the data of the I/O ports and I/O protect area added in the Add I/O Port Dialog Box.

Context Menu

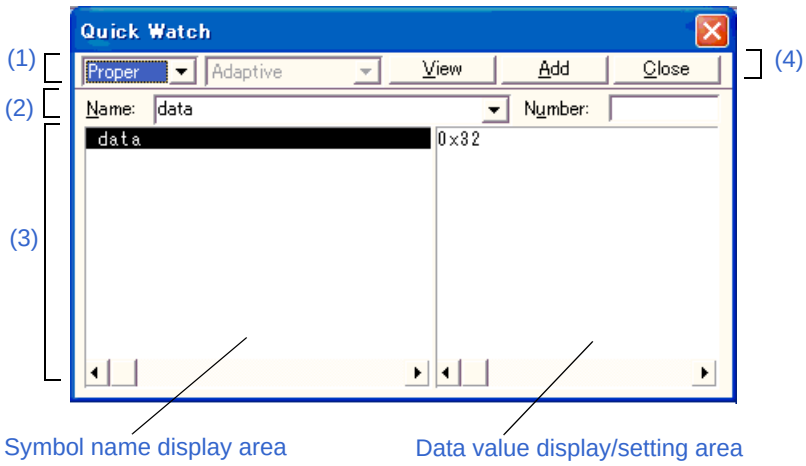
The menu items are effective for the selected line or item, not the position where the mouse pointer was clicked (same operation as when selecting the main menu with the same name).

Beak when Access to this Variable	Creates a break event that can be accessed for read/write by using the selected item.
Break when Write to this Variable	Creates a break event that can be accessed for write by using the selected item.
Break when Read from this Variable	Creates a break event that can be accessed for read by using the selected item.
Clear	Deletes a break event corresponding to the selected item.
RRM Setting...	Sets the sampling range of RRM function. Opens the RRM Setting Dialog Box. **[IECUBE]**
Event Information	Displays the event information of the variable selected. If an event is set, the Event Dialog Box is opened.
Change Watch...	Changes the selected watch data. Opens the Change Watch Dialog Box.
Delete Watch	Deletes the selected watch data from the window.
Bin	Displays the selected line in binary numbers.
Oct	Displays the selected line in octal numbers.
Dec	Displays the selected line in decimal numbers.
Hex	Displays the selected line in hexadecimal numbers.
String	Displays the selected line as a character string.
Proper	Displays the selected line as the default value of each variable. Symbols are displayed in accordance with the setting of the Debugger Option Dialog Box. (default)
Byte	Displays the selected line in 8-bit units.
Half Word	Displays the selected line in 16-bit units.
Word	Displays the selected line in 32-bit units.
Adaptive	Displays the selected line as the default value of each variable (default). Only this item is valid for a symbol in C language. Symbols in assembly language are displayed in accordance with the setting of the Debugger Option Dialog Box.
Up	Moves the selected line one line up.
Down	Moves the selected line one line down.

Quick Watch Dialog Box

This dialog box is used to temporarily display or change specified watch data. (Refer to "5.6 Watch Function".)

Figure 6-28 Quick Watch Dialog Box



- Opening
- Explanation of Each Area

Opening

When the Source Window or Assemble Window is the current window, select [View] menu -> [Quick Watch...], or click the <Quick...> button in same window.

Explanation of Each Area

(1) Display form specification area

Display radix selection area Proper	This area is used to select the display radix.	
	Proper	Variable: Displays the default value of each variable. Symbol: Displays data with the radix set in the Debugger Option Dialog Box.
	Hex	Displays in hexadecimal numbers.
	Dec	Displays in decimal numbers.
	Oct	Displays in octal numbers.
	Bin	Displays in binary numbers.
	String	Displays as a character string.

Display size selection area 	This area is used to select the display size. If the display size is fixed, such as when a variable in C language or register is to be displayed, it cannot be changed.	
	Adaptive	Variable: Displays the default value of each variable.Symbol: Displays data with the size set in the Debugger Option Dialog Box.
	Byte	Displays in 8-bit units.
	Half Word	Displays in 16-bit units.
	Word	Displays in 32-bit units.

(2) Watch data specification area

Name:	This area is used to specify the watch data to be displayed. In the default condition, the string selected in the window that called this dialog box is displayed. As necessary, the character string displayed can be changed. Up to 16 input histories can be recorded. If the contents of this area have been changed, the data specified can be displayed in the field below by clicking the <View> button.
Number:	This area is used to specify the number of data to be displayed (blank or a number of 1 to 256). If this area is blank, data is displayed as a simple variable. If a number of 1 or more is specified, data is displayed as an array variable in the Watch Window. If an array variable is displayed, "+" is prefixed to the data. By double-clicking this "+", all the elements of the data are expanded and displayed in accordance with the type of the data ("-" is prefixed to the expanded data. If this "-" is double-clicked, the expanded display is canceled). If the number of data to be displayed is fixed, such as when a variable in C language or register is to be displayed, the specified number of data is invalid.

(3) Watch data display area

The left area displays symbol names, and the right area displays data values.

Symbol name display area	This area is used to display watch data (variable names, symbol names and types, and tag names of structures or unions). (Refer to " Watch Window".) This area cannot be edited.
Data value display/setting area	This area is used to display and change data values. (Refer to " Watch Window".)

(4) Function buttons

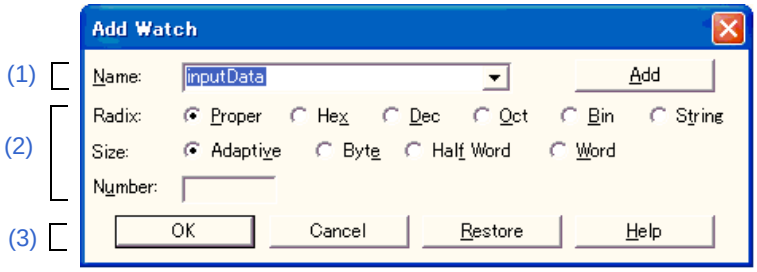
View	Displays the data specified in (2) Watch data specification area in the field below.
Add	Adds the data specified in (2) Watch data specification area to the Watch Window.
Close	Closes this dialog box. Data that has not actually been written to the target memory will be canceled.

Add Watch Dialog Box

This dialog box is used to register watch data to be displayed in the Watch Window. (Refer to "5.6 Watch Function".)

Multiple data with the same symbol name can be registered.

Figure 6-29 Add Watch Dialog Box



- Opening
- Explanation of Each Area

Opening

Select [View] menu -> [Add Watch...], or click the <Add...> button in the Watch Window.

Explanation of Each Area

(1) Watch data registration area

Name:	This area is used to specify symbol to be added to the Watch Window. (Refer to "Table 6-14 Watch Window Input Format".) In the default condition, the string selected in the window that called this dialog box is displayed. As necessary, the character string displayed can be changed. This area is blank if no character string is selected. Up to 16 input histories can be recorded.
<Add>	Adds the specified data to the Watch Window. The dialog box remains open.

Table 6-14 Watch Window Input Format

- Variable Name of C language	
Variable expression : Variable Name	
|Variable expression [Constant value | Variable Name]	Elements of array
|Variable expression . Member name	Entity members of structure/union
|Variable expression -> Member name	Members of structure/union indicated by pointer
|*Variable expression	Value of pointer variable
|&Variable expression	Address where variable is located
- Register name	
- IOR name, IOR bit name	
- Label and address of immediate value	
- Register name.bit	
- IOR name. bit	
- Label name.bit , address of immediate value.bit	
- Specification of scope	

How a variable is handled when a scope Is specified is as follows:

Table 6-15 How Variable Is Handled When Scope Is Specified

Scope Specification	Program Name	File Name	Function Name	Variable Name
prog$file#func#var	prog	file	func	var
prog$file#var	prog	file	global	var
prog$var	prog	global	global	var
file#func#var	current	file	func	var
file#var	current	file	global	var
var	current	current	current	var

(2) Display form change area

Radix:	This area is used to select the display radix.	
	Proper	Variable: Displays the default value of each variable. Symbol: Displays data with the radix set in the Debugger Option Dialog Box.
	Hex	Displays in hexadecimal numbers.
	Dec	Displays in decimal numbers.
	Oct	Displays in octal numbers.
	Bin	Displays in binary numbers.
	String	Displays in strings.
Size:	This area is used to select the display size. If the display size is fixed, such as when a variable in C language or register is to be displayed, it cannot be changed.	
	Adaptive	Variable: Displays the default value of each variable. Symbol: Displays data with the size set in the Debugger Option Dialog Box.
	Byte	Displays in 8-bit units.
	Half Word	Displays in 16-bit units.
	Word	Displays in 32-bit units.
Number:	This area is used to specify the number of data to be displayed (blank or a number of 1 to 256). If this area is blank, data is displayed as a simple variable. If a number of 1 or more is specified, data is displayed as an array variable in the Watch Window. If an array variable is displayed, "+" is prefixed to the data. By double-clicking this "+", all the elements of the data are expanded and displayed in accordance with the type of the data ("-" is prefixed to the expanded data. If this "-" is double-clicked, the expanded display is canceled). If the number of data to be displayed is fixed, such as when a variable in C language or register is to be displayed, the specified number of data is invalid.	

(3) Function buttons

OK	Adds the specified data to the Watch Window. Closes this dialog box.
Cancel	Closes this dialog box.
Restore	Restores the status before this dialog box was opened.
Help	Displays this dialog box online help files.

Change Watch Dialog Box

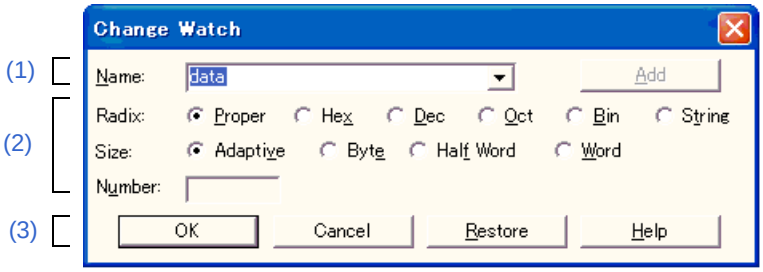
This window is used to change the data on a line selected in the Watch Window. (Refer to "5.6 Watch Function".)

A line with an open hierarchy, such as the elements of an array, and members of structures and unions cannot be changed.

When watch data is changed, the contents of the selected line are replaced with the new data.

The symbol name can be changed even if it results in duplication of a name already in use with existing data.

Figure 6-30 Change Watch Dialog Box



- Opening
- Explanation of Each Area

Opening

When the Watch Window is the current window, select [View] menu -> [Change Watch...].

Explanation of Each Area

(1) Watch data change area

Name:	This area is used to change a symbol name on a line selected in the Watch Window. (Refer to "Table 6-14 Watch Window Input Format".) The symbol name can be changed even if it results in duplication of a name already in use with existing data. In the default condition, the string selected in the window that called this dialog box is displayed. Up to 16 input histories can be recorded.
<Add>	Cannot be selected.

(2) Display form change area

Radix:	This area is used to change the display radix on a line selected in the Watch Window.	
	Proper	Variable: Displays the default value of each variable. Symbol: Displays data with the radix set in the Debugger Option Dialog Box.
	Hex	Displays in hexadecimal numbers.
	Dec	Displays in decimal numbers.
	Oct	Displays in octal numbers.
	Bin	Displays in binary numbers.
Size:	This area is used to change the display size on a line selected in the Watch Window. If the display size is fixed, such as when a variable in C language or register is to be displayed, it cannot be changed.	
	Adaptive	Variable: Displays the default value of each variable. Symbol: Displays data with the size set in the Debugger Option Dialog Box.
	Byte	Displays in 8-bit units.
	Half Word	Displays in 16-bit units.
	Word	Displays in 32-bit units.
Number:	This area is used to change the number of data to be displayed on a line selected in the Watch Window (blank or a number of 1 to 256). If this area is blank, data is displayed as a simple variable. If a number of 1 or more is specified, data is displayed as an array variable in the Watch Window. If an array variable is displayed, "+" is prefixed to the data. By double-clicking this "+", all the elements of the data are expanded and displayed in accordance with the type of the data ("-" is prefixed to the expanded data. If this "-" is double-clicked, the expanded display is canceled). If the number of data to be displayed is fixed, such as when a variable in C language or register is to be displayed, the specified number of data is invalid.	

(3) Function buttons

OK	Replaces the data on a line selected in the Watch Window with the specified data, and then closes this dialog box.
Cancel	Closes this dialog box.
Restore	Restores the status before this dialog box was opened.
Help	Displays this dialog box online help files.

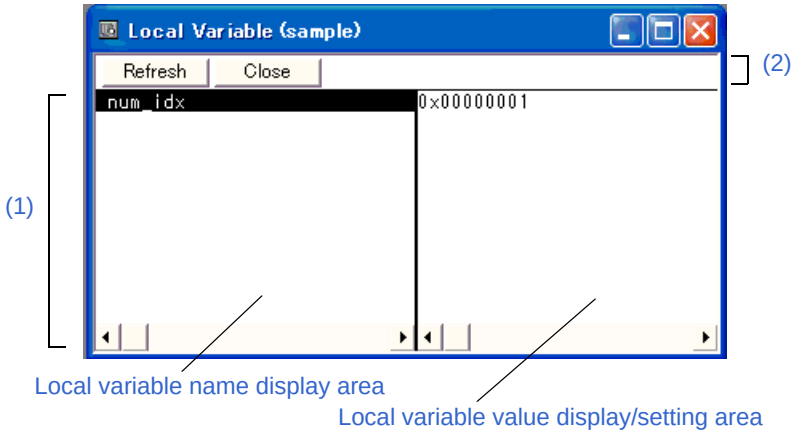
Local Variable Window

This window is used to display the local variable in the current function and change the local variable values. (Refer to "5.6.2 Displaying and changing local variable values".)

It is linked with the Jump function of the Stack Window, and displays the local variable in the function jumped when jumping to the Source Window.

A number of other operations using Context Menu, Function buttons, etc., can be performed in this window.

Figure 6-31 Local Variable Window



- Opening
- Explanation of Each Area
- [View] Menu (Local Variable Window-dedicated items)
- Context Menu

Opening

Click the **Loc** button, or select [Browse] menu -> [Local Variable].

Explanation of Each Area

(1) Local variable display/change area

Local variable name display area	This area displays local variable name. (Refer to " Symbol name display area" in the Watch Window.) Auto, Internal Static, and Register variables can be displayed. Local variables within the current function are automatically displayed in this window. This area cannot be edited.

Local variable value display/ setting area	This area is used to display and change local variable values. (Refer to " Data value display/setting area" in the Watch Window.) Values are changed through direct input. The location to be changed is displayed in red and the contents of the change are written into the target memory when the Enter key is pressed. During user program execution, however, the change cannot be written (if attempted, an error occurs). The previous value can be canceled by the ESC key.

(2) Function buttons

Refresh	Updates the contents of this window with the latest watch data.
Close	Closes this window.

[View] Menu (Local Variable Window-dedicated items)

When this window is the current window, the following items are added on [View] menu.

Bin	Displays binary numbers.
Oct	Displays octal numbers.
Dec	Displays decimal numbers.
Hex	Displays octal numbers.
String	Displays character strings.
Proper	Displays the default value of each variable. (default)

Context Menu

The menu items are effective for the selected line or item, not the position where the mouse pointer was clicked (same operation as when selecting the main menu with the same name).

Add Watch...	Opens the Add Watch Dialog Box.
Bin	Displays the selected line in binary numbers.
Oct	Displays the selected line in octal numbers.
Dec	Displays the selected line in decimal numbers.
Hex	Displays the selected line in hexadecimal numbers.
String	Displays the selected line as a character string.
Proper	Displays the selected line as the default value of each variable. Symbols are displayed in accordance with the setting of the Debugger Option Dialog Box. (default)

Stack Window

This window is used to display or change the current stack contents of the user program. (Refer to "5.6.7 Stack trace display function".)

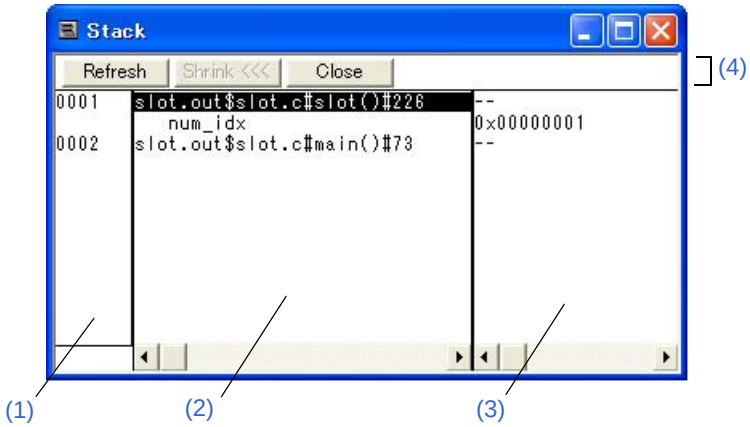
The window corresponding to the stack contents can be jumped to using the Jump function.

A number of other operations using Context Menu, Function buttons, etc., can be performed in this window.

Caution: The stack trace display function may not operate correctly if there is a function that does not create a stack frame.

Remark: [ERROR] may be displayed during prologue or epilogue processing of a function.

Figure 6-32 Stack Window



- Opening
- Explanation of Each Area
- [View] Menu (Stack Window-dedicated items)
- Context Menu

Opening

 Click the **Stk** button, or select [Browse] menu -> [Stack Trace].

Explanation of Each Area

(1) Stack frame number display area

This area assigns numbers to and displays the stack contents.

A stack frame number is a natural number starting from 1. The shallower the nesting of the stack, the higher the number. This means that a function having stack number one higher than that of a certain function is the function that calls the certain function.

(2) Stack frame contents display area

This area displays the stack frame contents.

It displays function names or local variable names. Note, however, that this area cannot be edited.

If the stack contents consist of a function	They are displayed as follows: **[program name$file name#function name (argument list) #line number]** If this line is double-clicked, the operation will be the same as jumping to the Source Window of the Jump function (i.e., the local variable in the function to which execution has jumped will be displayed in the Local Variable Window).If the function has a local variable, the local variable will be displayed on the next and subsequent lines.
If the stack contents consist of a local variable	Its type and name are displayed. (Refer to " Watch Window".) Note that the internal Static and Register variables are not displayed.

(3) Stack contents display/setting area

This area is used to display or change the stack contents.

Values are changed through direct input. The location to be changed is displayed in red and the contents of the change are written into the target memory when the Enter key is pressed. During user program execution, however, the change cannot be written (if attempted, an error occurs). The previous value can be canceled by the ESC key.

If the stack contents are a function	"--" is displayed and the function cannot be changed.
If the stack contents are a local variable	The variable value is displayed. (Refer to " Watch Window".)

(4) Function buttons

Refresh	Updates the contents of this window with the latest watch data.
Shrink <<<	Collapses the local variable list of the selected function.
Expand >>> (when the <Shrink<<<> button is clicked)	Displays the local variable list of the selected function.
Close	Closes this window.

[View] Menu (Stack Window-dedicated items)

When this window is the current window, The following items are added on [View] menu.

Bin	Displays binary numbers.
Oct	Displays octal numbers.
Dec	Displays decimal numbers.
Hex	Displays octal numbers.
String	Displays character strings.
Proper	Displays the default value of each variable. (default)

Context Menu

Bin	Displays binary numbers.
Oct	Displays octal numbers.
Dec	Displays decimal numbers.
Hex	Displays octal numbers.
String	Displays character strings.
Proper	Displays the default value of each variable. (default)
Source Text	Displays the corresponding source text and source line from the jump destination address specified by the data value at the cursor position. (Refer to "5.16.2 Jump function".) If no line information exists at the jump destination address, however, you cannot jump. Opens the Source Window. If an active Source Window is open, that window is displayed in the forefront (so that it can be manipulated).
Assemble	Disassembles and displays starting from the jump destination address specified by the data value at the cursor position. (Refer to "5.16.2 Jump function".) Opens the Assemble Window. If an active Assemble Window is open, that window is displayed in the forefront (so that it can be manipulated).
Memory	Displays the memory contents starting from the jump destination address specified by the data value at the cursor position. (Refer to "5.16.2 Jump function".) Opens the Memory Window. If an active Memory Window is open, that window is displayed in the forefront (so that it can be manipulated).

Memory Window

This window is used to display and change the memory contents. (Refer to "5.7 Memory Manipulation Function".) Other operations using Context Menu, Function buttons, etc., can be performed in this window.

Moreover, there are two statuses, Active status and static status, for this window. When the window is in the active status, it has the Trace result with linking window [IECUBE], Jump function. (Refer to "5.16 Functions Common to Each Window".)

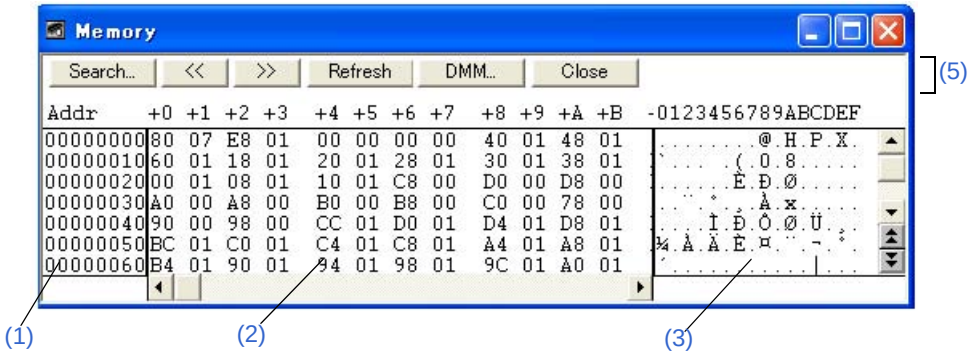
Remark1: The memory access status (read, write, read & write) can be displayed using different colors. (Refer to "5.7.2 Access monitor function [IECUBE]".) **[IECUBE]**

Remark2: The display start position when the this window is opened is as follows:

First time: Display starts from the first address of the RAM area.

Second and subsequent times: Display starts from the address at which an active status window was closed. (if an active status window has never been closed, display starts from the first display start position).

Figure 6-33 Memory Window



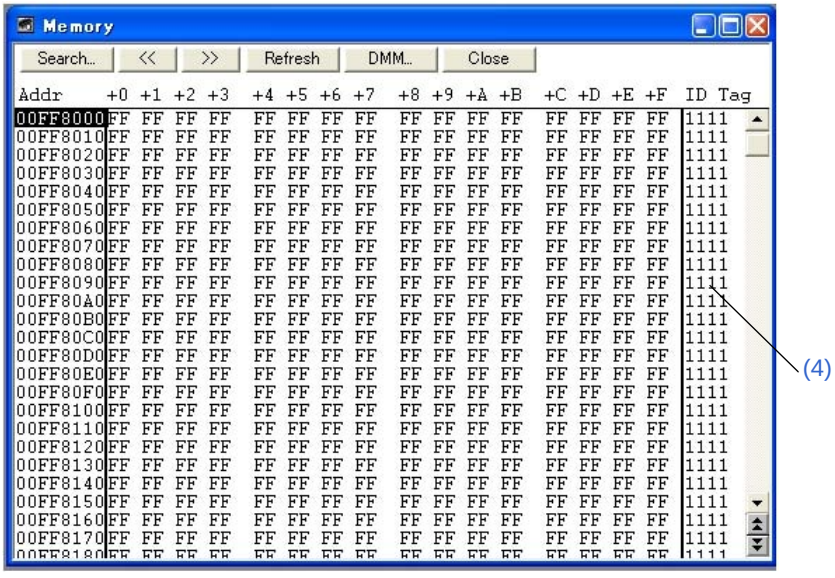
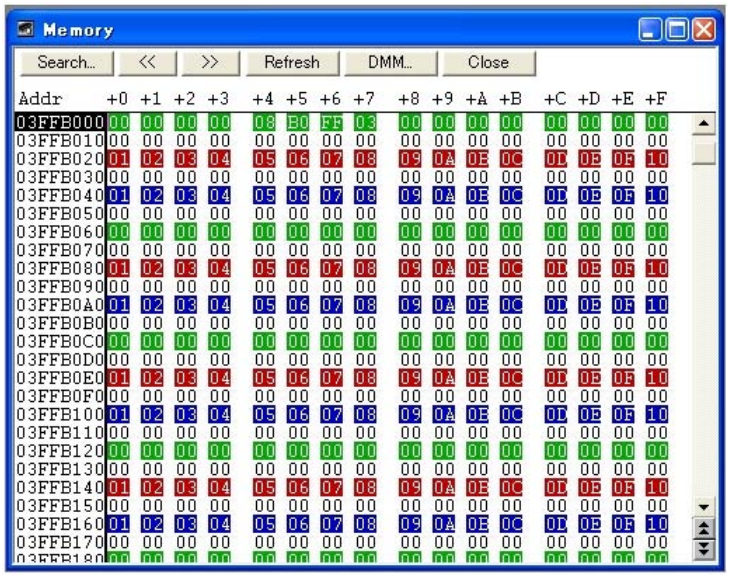


Figure 6-34 Memory Window (When RRM Function Is Selected)



- Opening
- Explanation of Each Area
- [View] Menu (Memory Window-dedicated items)
- Context Menu

Opening

 Click the **Mem** button, or select [Browse] menu -> [Memory].

Explanation of Each Area

(1) Addr

This area displays memory addresses.

An arbitrary address can be selected by clicking the relevant line in this area. The selected address is highlighted.

(2) +0 +1 +2....

This area is used to display and change memory contents, and to display the access status. (Refer to "5.7.2 Access monitor function [IECUBE]".)

Display		Symbol Substituted When Display Information is Saved in View File	Meaning
	Green	R	Read
	Red	W	Write
	Blue	A	Read & write
	No highlight color	None	Out of measurement range

Memory contents are changed through direct input. The location to be changed is displayed in red and the contents of the contents of the change are written into the target memory when the Enter key is pressed. The previous value can be canceled by the ESC key. Up to 256 bytes can be specified at one time.

Remark: To change the memory contents during user program execution, open the DMM Dialog Box by clicking the <DMM...> button.

(3) 0 1 2 3....

This area is used to display and change the memory contents in ASCII characters.

This area is displayed when [View] menu -> [Ascii] is selected.

Data can be changed in this area in the same manner as in the memory display area.

The changing method is the same as in (2) +0 +1 +2.....

Remark: When the display address is changed, the position of the cursor in the ASCII display area is not synchronized.

(4) ID Tag

This area displays the ID tag for the data flash memory.

The ID tag is a bit whose one bit is assigned to one word of the data flash memory and is used to detect power failure. When it is "0", it means that data in the word has been written normally.

The setting for this area can be changed between "0" and "1".

Whether this area is displayed can be switched by selecting [ID tag] from the [View] menu (default: hidden). This area is displayed exclusively with the area "(3) 0 1 2 3....".

(5) Function buttons

Search...	Opens the Memory Search Dialog Box and searches for character strings from the displayed memory contents, or memory contents. Selected data (a memory value) is displayed in the Memory Search Dialog Box as data to be searched.If the Memory Search Dialog Box is opened without data specified, specify data from the keyboard. The results of the search is highlighted in the Memory window.
<<	Searches the memory contents satisfying the search condition set in the Memory Search Dialog Box, forward (upward on screen) from the address at the cursor position. This button is displayed as the <Stop> button during a search.
>>	Searches the memory contents satisfying the search condition set in the Memory Search Dialog Box, backward (downward on screen) from the address at the cursor position. This button is displayed as the <Stop> button during a search.
Stop(searching)	Stops searching.
Refresh	Updates the contents of the window with the latest data.
DMM...	Opens the DMM Dialog Box.
Close	Closes this window.

[View] Menu (Memory Window-dedicated items)

The following items are added in the [View] menu , when the Memory Window is active.

Bin	Displays binary numbers.
Oct	Displays octal numbers.
Dec	Displays decimal numbers.
Hex	Displays hexadecimal numbers (default).
Nibble	Displays in 4-bit units.
Byte	Displays in 8-bit units (default).
Half Word	Displays in 16-bit units.
Word	Displays in 32-bit units.
Ascii	Selects whether ASCII characters are displayed or not. Selected: Displayed Cleared: Hidden (default)
ID tag	Switches whether to display the data flash memory ID tag. Selected: Displayed Not selected: Hidden (default) This ID tag display is displayed exclusively with the Ascii display.
Little Endian	Displays in little endian (default).
Big Endian	Displays in big endian.
Access Monitoring **[IECUBE]**	Sets about Access monitor function.

Clear **[IECUBE]**	Clears the display color through the access monitor function.
Accumulative **[IECUBE]**	Enables/disables cumulative display of access status (memory content change). Selected: Cumulative display of memory contents changes Not selected: Display of only memory contents changes from previous update.

Context Menu

The menu items are effective for the selected line or item, not the position where the mouse pointer was clicked (same operation as when selecting the main menu with the same name).

Move...	Moves the display position. Opens the Address Move Dialog Box.
RRM Setting...	Opens the RRM Setting Dialog Box. **[IECUBE]**
Bin	Displays binary numbers.
Oct	Displays octal numbers.
Dec	Displays decimal numbers.
Hex	Displays hexadecimal numbers. (default)
Nibble	Displays in 4-bit units.
Byte	Displays in 8-bit units. (default)
Half Word	Displays in 16-bit units.
Word	Displays in 32-bit units.
Ascii	Selects whether ASCII characters are displayed or not. Selected: Displayed Cleared: Hidden (default)
ID tag	Switches whether to display the data flash memory ID tag. Selected: Displayed Cleared: Hidden (default) This ID tag display is displayed exclusively with the Ascii.
Clear Access Monitoring **[IECUBE]**	Clears the display color through the access monitor function.
Accumulative **[IECUBE]**	Enables/disables cumulative display of access status (memory content change). Selected: Cumulative display of memory contents changes Cleared: Display of only memory contents changes from previous update.

Memory Search Dialog Box

This dialog box is used to search the memory contents of the part of the Memory Window at which the cursor is located. (Refer to "5.7 Memory Manipulation Function".)

If the cursor is placed in memory display area in the Memory Window, the specified data is treated as a binary data string, and if the cursor is placed in the ascii display area, the specified data is treated as an ASCII character string, and the contents of these respective areas are searched.

By setting each item and then clicking the <Find Next> button, searching can be started. By clicking the <Set Find> button, the direction buttons ("<<" and ">>") in the Memory Window can be used for the search.

Caution: Non-mapped, peripheral I/O registers, and I/O protect areas are not searched.

Figure 6-35 Memory Search Dialog Box

- Opening
- Explanation of Each Area

Opening

When the Memory Window is the current window, select [View] menu -> [Search...], or click the <Search...> button in the same window.

Explanation of Each Area

(1) Search condition specification area

Find What:	This area is used to specify the data to be searched. (Up to 256 character.) In the default condition, the string selected in the window that called this dialog box is displayed. As necessary, the character string displayed can be changed. Up to 16 input histories can be recorded.	
	When searching in memory display area	Up to 16 data items can be specified. Delimit each data with a "blank character".
	When searching in ascii display area	Up to 256 characters can be specified. A "blank character" in the data is treated as a blank character.
Unit:	This area is used to specify the number of bits of the data to be searched in memory display area.	
	Byte	Searches the data as 8-bit data. (default)
	Half Word	Searches the data as 16-bit data.
	Word	Searches the data as 32-bit data.
Scan Whole Region	This should be selected to search the entire specified range.	
Direction	This area is used to specify the direction of the search.	
	Up	Forward search. Searches data forward (upward on screen) from the current position of the cursor.
	Down	Backward search. Searches data backward (downward on screen) from the current position of the cursor. (default)
Address:	This area is used to specify the address range to be searched. The default radix for inputting a numeric value is hexadecimal. An address can be also specified by a symbol or expression. (Refer to "Table 5-6 Specifying Symbols".)	

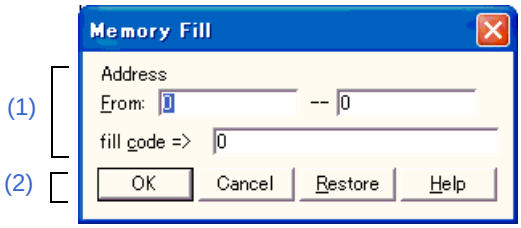
(2) Function buttons

Find Next	Searches the specified data in accordance with a given condition. If the specified character string is found as a result of a search, it is highlighted. To continue searching, click this button again.
Set Find	Sets the specified condition as the search condition and closes this dialog box.
Stop (searching)	Stops searching.
Close	Closes this dialog box.(During searching, this button is replaced by the <Stop> button.)
Help	Displays this dialog box online help files.

Memory Fill Dialog Box

This dialog box is used to fill the memory contents in the Memory Window with specified codes (fill code). (Refer to "5.7 Memory Manipulation Function".)

Figure 6-36 Memory Fill Dialog Box



- Opening
- Explanation of Each Area

Opening

Select [Edit] menu -> [Memory] -> [Fill...].

Explanation of Each Area

(1) Memory fill range specification area

Address	This area is used to specify the filling range and fill code.	
	From:	Specifies the filling range (start address -- end address). The default radix for inputting a numeric value is hexadecimal. An address can be also specified by a symbol or expression. (Refer to "Table 5-6 Specifying Symbols".)
	fill code =>	Specify the data (fill code) used when filling the range specified in "From: “. Up to 16 binary data strings (byte data strings) can be specified. Delimit each data with a "blank character".

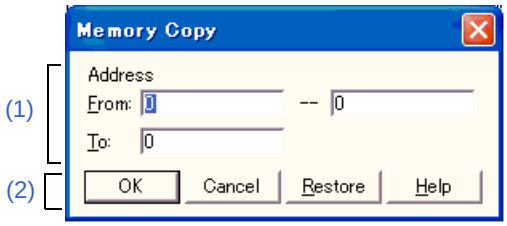
(2) Function buttons

OK	Fills the specified data in accordance with a given condition.
Stop (filling)	Stops filling.
Cancel	Closes this dialog box. (During filling, this button is replaced by the <Stop> button.)
Restore	Restores the status before this dialog box was opened.
Help	Displays this dialog box online help files.

Memory Copy Dialog Box

This dialog box is used to copy the memory contents in the Memory Window. (Refer to "5.7 Memory Manipulation Function".)

Figure 6-37 Memory Copy Dialog Box



- Opening
- Explanation of Each Area

Opening

Select [Edit] menu -> [Memory] -> [Copy...].

Explanation of Each Area

(1) Copy range specification area

Address	This area is used to specify the copy source and copy destination addresses. The default radix for inputting a numeric value is hexadecimal. An address can be also specified by a symbol or expression. (Refer to "Table 5-6 Specifying Symbols".)	
	From:	Specify the address range (start address -- end address) of the copy source.
	To:	Specify start address of the copy destination.

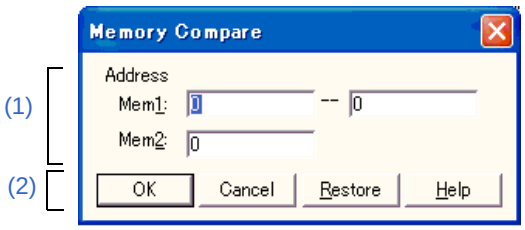
(2) Function buttons

OK	Copies the memory contents in accordance with a given condition.
Stop (copying)	Stops copying.
Cancel	Closes this dialog box.(During copying, this button is replaced by the <Stop> button.)
Restore	Restores the status before this dialog box was opened.
Help	Displays this dialog box online help files.

Memory Compare Dialog Box

This dialog box is used to compare the memory contents in the Memory Window. (Refer to "5.7 Memory Manipulation Function".)

Figure 6-38 Memory Compare Dialog Box



- Opening
- Explanation of Each Area

Opening

Select [Edit] menu -> [Memory] -> [Compare...].

Explanation of Each Area

(1) Comparison range specification area

Address	This area is used to specify the comparison source address and comparison destination address. The default radix for inputting a numeric value is hexadecimal. An address can be also specified by a symbol or expression. (Refer to "Table 5-6 Specifying Symbols".)	
	Mem1:	Specify the address range (start address -- end address) of the comparison source.
	Mem2:	Specify the start address of the comparison destination.

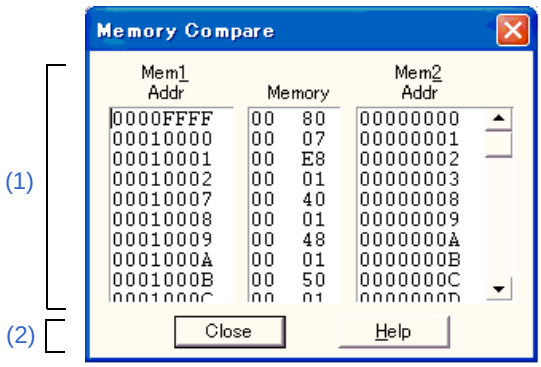
(2) Function buttons

OK	Compares the memory contents in accordance with a given condition. If no difference is found as a result of comparison, " Wf200: No difference encountered." is displayed. If a difference is found, the Memory Compare Result Dialog Box is opened.
Stop (comparison)	Stops memory comparison.
Cancel	Closes this dialog box.(During comparison, this button is replaced by the <Stop> button.)
Restore	Restores the status before this dialog box was opened.
Help	Displays this dialog box online help files.

Memory Compare Result Dialog Box

This dialog box is displayed if any difference is found in the memory contents when the memory has been compared in the Memory Compare Dialog Box. (Refer to "5.7 Memory Manipulation Function".)

Figure 6-39 Memory Compare Result Dialog Box



- Explanation of Each Area

Explanation of Each Area

(1) Comparison result display area

This area displays the results of comparing the memory. Only differences that have been found as a result of comparison are displayed.

Mem1 Addr	Displays a comparison source address in which a difference has been found.
Memory	Displays the data in which a difference has been found. (Left: Comparison source data, Right: Comparison destination data).
Mem2 Addr	Displays the comparison destination address at which a difference has been found.

(2) Function buttons

Close	Closes this dialog box.
Help	Displays this dialog box online help files.

DMM Dialog Box

This dialog box is used to set addresses and data for DMM (Dynamic Memory Modification). (Refer to "5.14 DMM Function".)

The memory contents are rewritten via the DMM function during user program execution.

Caution: When IECUBE is connected, a pseudo DMM function is performed. With pseudo DMM, a break occurs instantaneously upon a write during the user program execution.

Figure 6-40 DMM Dialog Box(Ex: When "Memory" is selected)

- Opening
- Explanation of Each Area

Opening

Select [Edit] menu -> [DMM...], or click the <DMM...> button in the Memory Window / Register Window / IOR Window.

Explanation of Each Area

(1) DMM target selection area

This area is used to select the target for DMM. The items displayed in (2) DMM setting area change by selecting the option button.

Memory	DMM is performed for the memory.
Register	DMM is performed for the register.
IOR	DMM is performed for the IOR.

Remark: If the DMM Dialog Box is opened via the Memory Window, Register Window, or IOR Window, the corresponding option button has already been selected.

(2) DMM setting area

(a) When Memory is selected

Memory Address:	This area is used to specify the memory address to which data is to be written. The default radix for inputting a numeric value is hexadecimal. An address can be also specified by a symbol or expression. (Refer to "Table 5-6 Specifying Symbols".)	
Write Data:	This area is used to specify the data to be written to the memory address specified in "Memory Address:".	
Data Size:	This area is used to specify the size of the data specified in "Write Data:" to be written.	
	Byte:	Writes the data as 8-bit data.
	Half Word:	Writes the data as 16-bit data.
	Word:	Writes the data as 32-bit data.

(b) When Register is selected

Register Name:	This area is used to specify the register name to which data is to be written. The case is distinguished. Both functional and absolute names can be used for specification.
Write Data:	This area is used to specify the data to be written to the register specified in "Register Name:".

(c) When IOR is selected

IOR Name:	This area is used to specify the IOR name to which data is to be written. The case is distinguished. The read-only SFRs cannot be specified.
Write Data:	IORThis area is used to specify the data to be written to the register specified in "IOR Name:".

(3) Function buttons

Set	Writes the data in accordance with a given condition.
Close	Closes this dialog box.
Help	Displays this dialog box online help files.

Register Window

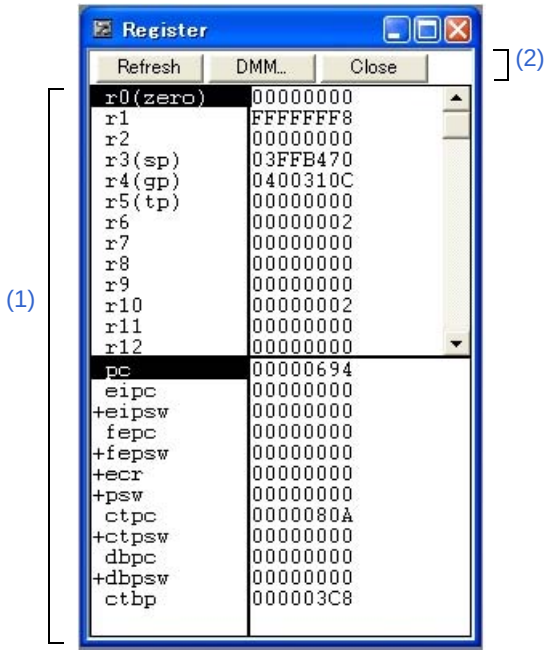
This window is used to display and change registers (program register/system register). (Refer to "5.8 Register Manipulation Function".)

Other operations using Context Menu, Function buttons, etc., can be performed in this window.

Each area in this window are the jump pointer of the Jump function.

Caution: The ECR register value cannot be changed and the DBPC and DBPSW registers cannot be used in the Register window.

Figure 6-41 Register Window



- Opening
- Explanation of Each Area
- [View] Menu (Register Window-dedicated items)
- Context Menu

Opening

 Click the **Reg** button, or select [Browse] menu -> [Register].

Explanation of Each Area

(1) Register value display /change area

The left area displays register names, and the right area displays register values.

Register values are changed through direct input. The location to be changed is displayed in red and the contents of the contents of the change are written into the target memory when the Enter key is pressed. During user program execution, however, the change cannot be written (if attempted, an error occurs). The previous value can be canceled by the ESC key.

The upper area displays the program register, and the lower area displays the system register.

The program register display/ change area	This area is used to display and change the program register.
The system register display/ change area	This area is used to display and change the system register. By double-clicking "+", flag name and flag value are displayed (first character changes from "+" to "-"). Expanded display is canceled by double-clicking "-" (first character changes from "-" to "+").

Caution: When overflow of a register occurs due to an illegal value entered by the user, the register will be updated with a value of 0xFFFFFFFF.

(2) Function buttons

Refresh	Updates the contents of the window with the latest data.
DMM...	Opens the DMM Dialog Box.
Close	Closes this window.

[View] Menu (Register Window-dedicated items)

The following items are added in the [View] menu , when the Register Window is active.

Bin	Displays binary numbers.
Oct	Displays octal numbers.
Dec	Displays decimal numbers.
Hex	Displays hexadecimal numbers (default).

Pick Up	Displays only the registers selected in the Register Select Dialog Box.
Select...	Opens the Register Select Dialog Box.

Context Menu

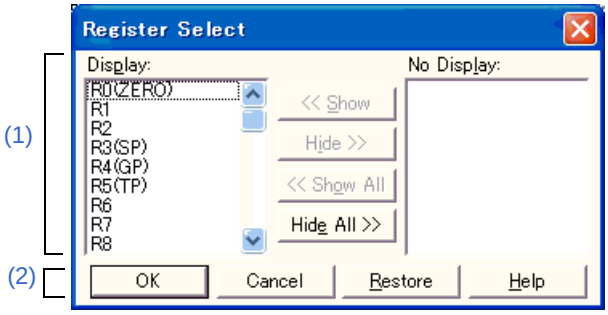
Add Watch...	Registers a selected character string to the Watch window. Opens the Add Watch Dialog Box.
Bin	Displays binary numbers.
Oct	Displays octal numbers.
Dec	Displays decimal numbers.
Hex	Displays hexadecimal numbers (default).

Pick Up	Displays only the registers selected in the Register Select Dialog Box.
Select...	Opens the Register Select Dialog Box.

Register Select Dialog Box

This dialog box is used to select registers that are not displayed in the Register Window. (Refer to "5.8 Register Manipulation Function".)

Figure 6-42 Register Select Dialog Box



- Opening
- Explanation of Each Area

Opening

When the Register Window is the current window, select [View] menu -> [Select...].

Explanation of Each Area

(1) Display register selection area

Display:	Registers displayed in the Register Window.	
Button	The following buttons are used to change register to be displayed. Two or more registers can be selected by clicking any of the above buttons while holding down the Ctrl or Shift key.	
	<< Show	Moves the register selected from the "No Display:" list to "Display:".
	Hide >>	Moves the register selected from the "Display:".list to "No Display:".
	<< Show All	Moves all registers to "Display:".
	Hide All >>	Moves all registers to "No Display:".
No Display:	Registers not displayed in the Register Window.	

(2) Function buttons

OK	Reflects the selection in this dialog box in the Register Window and closes this dialog box.
Cancel	Cancels the changes and closes this dialog box.
Restore	Restores the status before this dialog box was opened.
Help	Displays this dialog box online help files.

IOR Window

This window is used to display and change the contents of peripheral I/O registers and the I/O ports that have been registered in the Add I/O Port Dialog Box. (Refer to "5.8 Register Manipulation Function".)

A number of other operations using Context Menu, Function buttonsetc., can be performed in this window.

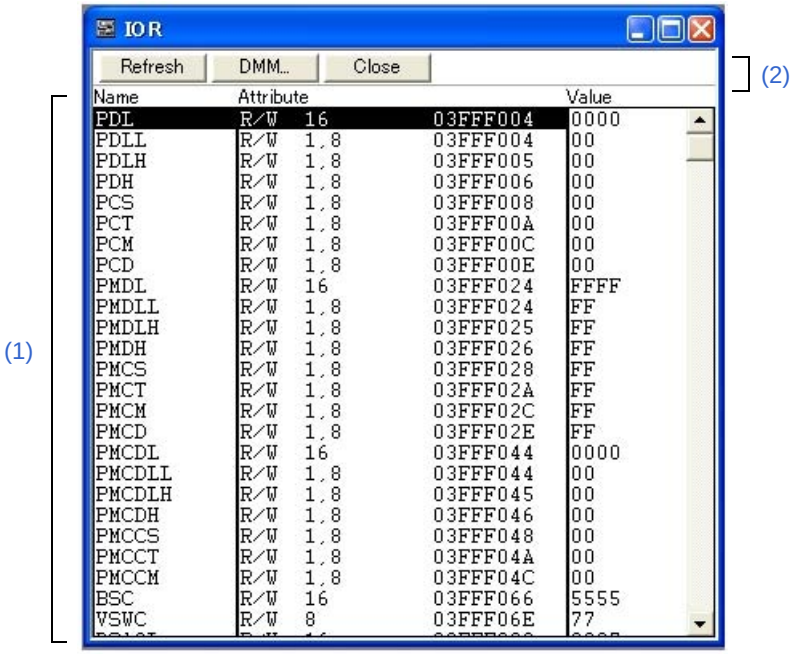
Caution1: However, that the values of read-only peripheral I/O registers and I/O ports cannot be changed. In addition, the peripheral I/O registers and I/O ports that cause the device to operate when they are read are read-protected and therefore cannot be read. To read these registers, select a register, and select and execute [Compulsion Read] from the Context Menu.

Caution2: During user program execution, the IOR contents are updated at every sampling time set in the Extended Option Dialog Box (refer to "5.13 RRM Function"). However, updating is not performed when the RAM monitor function is OFF. **[IECUBE]**

Remark1: The display start position when the window is opened is as follows.
First time: Display from peripheral I/O registers of minimum address
Second and subsequent times: Display from first peripheral I/O registers when window was last closed

Remark2: If the device supports programmable I/O registers and a programmable I/O area has been set in the Configuration Dialog Box, the programmable I/O registers and expansion peripheral I/O registers are also displayed. If the value of an I/O port address is defined, the I/O port name is displayed in light color.

Figure 6-43 IOR Window



Opening

 Click the **IOR** button, or select [Browse] menu -> [IOR].

Explanation of Each Area

(1) IOR display/change area

Name	This area displays the names of peripheral I/O registers and I/O ports. If the value of an I/O port address is not defined, the I/O port name displayed in light color.	
Attribute	This area displays the attributes of peripheral I/O registers and I/O ports. This area displays the read/write attributes, access types, and displays and absolute addresses from the left side. When the bit peripheral I/O registers is displayed, bit-offset value is also displayed. It can be specified whether this area is displayed or not, by selecting [View] menu -> [Attribute].	
	Read/Write Attribute	
	R	Read only
	W	Write only
	R/W	Read/write
	*	Register that is read via an emulation register to prevent the device from operating when this register is read. To read this attribute directly from a peripheral I/O registers, execute [View] menu -> [Compulsion Read]. Even a write-only peripheral I/O registers can also be read via an emulation register. However, some devices do not support this function.
	Access Type	
	1	Can be accessed in Bit units.
	8	Can be accessed in Byte units.
	16	Can be accessed in Half Word units.
	32	Can be accessed in Word units.

<table>
<tr><td>Value</td><td>This area is used to display and change the contents of a peripheral I/O registers and I/O port.
Values are changed through direct input. The location to be changed is displayed in red and the contents of the contents of the change are written into the target memory when the Enter key is pressed. During user program execution, however, the change cannot be written (if attempted, an error occurs). The previous value can be canceled by the ESC key.
Note that the values of read-only peripheral I/O registers and I/O ports cannot be changed.
The value of read-protected peripheral I/O registers and I/O ports can be read by selecting Context Menu -> [Compulsion Read].
The contents are displayed differently as follows, depending on the attribute:<table><tr><td>Black Display</td><td>Read only or read/write</td></tr><tr><td>--</td><td>Write only</td></tr><tr><td>**</td><td>Value changes if read</td></tr></table></td></tr>
</table>

(2) Function buttons

Refresh	Updates the contents of the window with the latest data.
DMM...	Opens the DMM Dialog Box.
Close	Closes this window.

[View] Menu (IOR Window-dedicated items)

When this window is the current window, the following items are added on [View] menu.

Bin	Displays binary numbers.
Oct	Displays octal numbers.
Dec	Displays decimal numbers.
Hex	Displays octal numbers. (default)
Sort By Name	Displays in alphabetical order.
Sort By Address	Displays in address order. (default)
Unsort	Does not sort.
Attribute	Switches on/off display of "Attribute".
Pick Up	Displays only the registers selected in the IOR Select Dialog Box.
Select...	Opens the IOR Select Dialog Box.
Compulsion Read	Forcibly reads the peripheral I/O registers that are disabled from being read because their values will be changed, or the data of the I/O ports and I/O protect area added in the Add I/O Port Dialog Box.

Context Menu

Move...	Opens the Address Move Dialog Box.
Add Watch...	Opens the Add Watch Dialog Box.
Add I/O Port...	Opens the Add I/O Port Dialog Box.
Bin	Displays binary numbers.
Oct	Displays octal numbers.
Dec	Displays decimal numbers.
Hex	Displays octal numbers.(default)
Sort By Name	Displays in alphabetical order.
Sort By Address	Displays in address order. (default)
Unsort	Does not sort.
Attribute	Switches on/off display of "Attribute".
Pick Up	Displays only the registers selected in the IOR Select Dialog Box.
Select...	Opens the IOR Select Dialog Box.
Compulsion Read	Forcibly reads the peripheral I/O registers that are disabled from being read because their values will be changed, or the data of the I/O ports and I/O protect area added in the Add I/O Port Dialog Box.

Cautions

When the V850E2/ME3 is used, the USB-related registers cannot be accessed without UCLK connected. If a USB-related register is to be displayed on the IOR Window or Watch Window, therefore, the debugger may hang up. To avoid this, save the following Tcl command as a text file, and perform batch processing by executing source*file* on the console window of the debugger (refer to "CHAPTER 7 COMMAND REFERENCE").

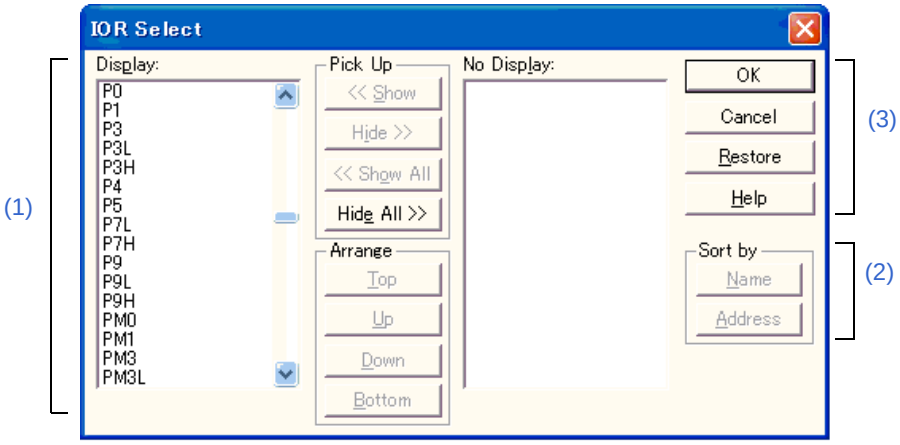
```
set save_UCKC 0
register UCKC 2

proc BeforeCpuRun {} {
        register UCKC $::save_UCKC
}

proc AfterCpuStop {} {
        set ::save_UCKC [register UCKC]
        register UCKC 2
}

proc AfterCpuReset {} {
        set ::save_UCKC 0
        register UCKC 2
}
```

IOR Select Dialog Box

This dialog box is used to select peripheral I/O registers and I/O ports that are not displayed the IOR Window. (Refer to "5.8 Register Manipulation Function".)

It is also used to specify the sequence in which registers and ports are displayed.

Figure 6-44 IOR Select Dialog Box



- Opening
- Explanation of Each Area

Opening

When the IOR Window is the current window, select [View] menu -> [Select...].

Explanation of Each Area

(1) Displayed peripheral I/O registers selection/display order change area

Display:	Registers displayed in the IOR Window. Two or more registers can be selected by clicking any of the above buttons while holding down the Ctrl or Shift key.	
Pick Up	The following buttons are used to change peripheral I/O registers to be displayed.	
	<< Show	Moves the register selected from the "No Display:" list to "Display:".
	Hide >>	Moves the register selected from the "Display: ".list to "No Display:".
	<< Show All	Moves all registers to "Display:".
	Hide All >>	Moves all registers to "No Display:".
Arrange	The following buttons are used to change the display sequence in "Display:". If the display arrangement is changed, multiple lines cannot be selected. Select one line at a time.	
	Top	Moves the selected register to the top of the list.
	Up	Moves the selected register one line up.
	Down	Moves the selected register one line down.
	Bottom	Moves the selected register to the bottom of the list.
No Display:	Registers not displayed in the IOR Window.	

(2) Display order change buttons

Sort by	The following buttons are used to change the display sequence in "No Display:".	
	Name	Displays in alphabetical order.
	Address	Displays in address order.

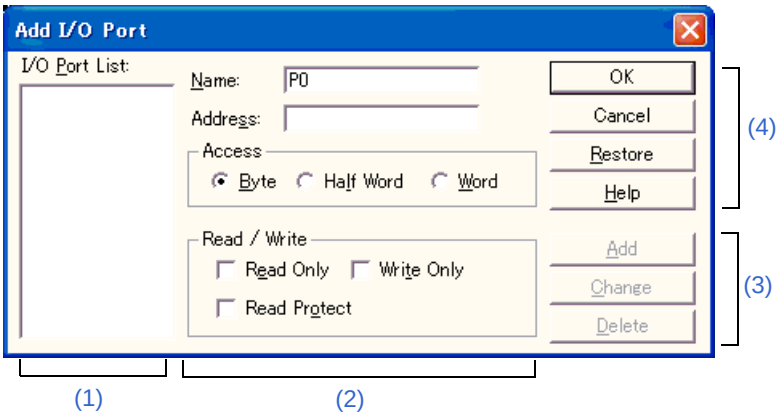
(3) Function buttons

OK	Reflects the selection in this dialog box in the IOR Window and closes this dialog box.
Cancel	Cancels the changes and closes this dialog box.
Restore	Restores the status before this dialog box was opened.
Help	Displays this dialog box online help files.

Add I/O Port Dialog Box

This dialog box is used to register an I/O port to be added to the IOR Window. (Refer to "5.8 Register Manipulation Function".)

Figure 6-45 Add I/O Port Dialog Box



- Opening
- Explanation of Each Area

Opening

Select [Option] menu -> [Add I/O Port...].

Explanation of Each Area

(1) I/O Port List:

This area lists the I/O ports currently registered.

If a new I/O port is registered, it is added to this list. An I/O port already registered can be selected and changed or deleted by (3) Buttons.

(2) I/O port specification area

Name:	This area is used to specify an I/O port name to be added (up to 15 characters long).	
Address:	This area is used to specify the address of the I/O port to be added. The default radix for inputting a numeric value is hexadecimal. An address can be also specified by a symbol. (Refer to "Table 5-6 Specifying Symbols".) The address that can be set in this area is either a Target area address or peripheral I/O registers area address.	
Access	This area is used to select the access size of the I/O port to be added.	
	Byte	8-bit unit (default)
	Half Word	16-bit unit
	Word	32-bit unit
Read / Write	This area is used to specify the access attribute of the I/O port to be added. In the default condition, all the attributes are not selected (i.e., the I/O port can be both read and written).	
	Read Only	Read Only
	Write Only	Write only
	Read Protect	Read-protected

(3) Buttons

Add	Adds an I/O port of the specified address.
Change	Changes the setting of the I/O port selected in "I/O Port List:".
Delete	Deletes the I/O port selected in "I/O Port List:".

(4) Function buttons

OK	Reflects the results of addition in the IOR Window and closes this dialog box.
Cancel	Cancels the changing, closes this dialog box.
Restore	Restores the original status.
Help	Displays this dialog box online help files.

Timer Dialog Box

[IECUBE]

This dialog box is used to register and set timer event conditions, and display execution time measurement results. (Refer to "5.12 Event Function" and "5.9 Timer Function [IECUBE]".)

The "Execution time display area" can be constantly displayed as the Timer Result Dialog Box by clicking the <View Always> button.

Registration and setting of timer event conditions is done by setting each item (256 items max.) in this dialog box and then pressing the <OK> button. The registered timer event conditions are managed by the Event Manager.

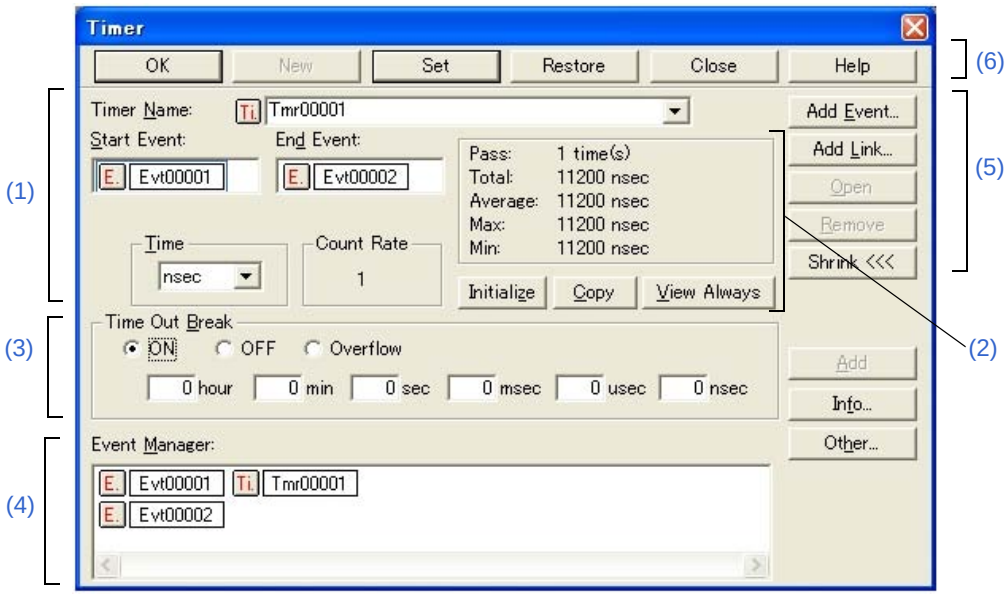
The number of timer event conditions that can be simultaneously used (validated) is limited. (Refer to "5.12.4 Number of enabled events for each event condition".)

The execution time measurement result is displayed when the set timer event condition is selected.

Remark1: The measurement result display contents are updated at each sampling time of the RRM Function, even during user program execution.

Remark2: Timer event condition setting/enable/disable/delete operations are possible even during user program execution.

Figure 6-46 Timer Dialog Box



- Opening
- Explanation of Each Area

Opening

Click the **Tim** button, or select [Event] -> [Timer...] on the menu.

Explanation of Each Area

(1) Timer event condition setting area

Timer Name:	This area is used to set a timer event name. Directly input an alphanumeric string of up to eight characters as a name. To display the contents of an already created event condition, select from the drop-down list. To display from user program execution until break, specify "Run-Break". (Refer to "5.9.2 Run-Break event".) The mark on the left of this area indicates the utilization status of events. (Refer to "Table 5-18 Event Icon".) The gray mark indicates that an event condition is being edited and has not been registered yet. By clicking the left mark, an event condition can be validated or invalidated.
Start Event: End Event:	This area is used to set an event condition for the timer. The number of event conditions that can be registered in this area is one for each of the start and end conditions. Setting of event conditions is easily done by dragging the icon of the event to be set from the event manager area and dropping it in this area. For details, refer to "5.12.3 Setting event conditions".
Time	This area is used to select the unit in which the (2) Execution time display area is to be displayed.
Count Rate	This area displays timer count rate values (the values set in (2) Timer [IECUBE] in the Extended Option Dialog Box). (The timer count rate value at the time of the event creation is displayed when the contents of the existing timer event conditions are displayed. The current timer count rate value is displayed when the event is newly created, or when the contents of the Run-Break event conditions are displayed.) This area cannot be edited. When the timer count rate value of the existing timer event conditions needs to be changed, first, change the value of (2) Timer [IECUBE] in the Extended Option Dialog Box. Then, reset the timer event conditions. When the timer count rate value at the time of the event creation is different from the value set in (2) Timer [IECUBE] in the Extended Option Dialog Box), the timeout time is affected. Therefore, the value in this area is displayed in red (refer to "5.9.3 Cautions").

(2) Execution time display area

This area displays the result of measuring the execution time of the program.

Only "Total" is displayed for Run-Break.

Measurement results that cannot be trusted due to counter overflow are displayed in red.

Pass:	Number of passes
Total:	Total execution time in the measurement zone specified by start event and end event conditions
Average:	Average execution time
Max:	Maximum execution time
Min:	Minimum execution time
<Initialize>	Clears the measurement results.
<Copy>	Copies the measurement result to the clipboard in text format.
<View Always>	Opens the Timer Result Dialog Box.

Table 6-16 Measurable Values

Connected IE	Measurable Execution Time	Measurable Execution Count
[IECUBE]	(Total, Max, Min = 33bit, External clock = 50 MHz) Approx. 2.8 minutes max. (1 division, resolution = 20 nsec) Approx. 195.2 hours max.(4K division, resolution = 81920 nsec)	16 bit 65,535 times max.

(3) Time Out Break

This area is used to set the timeout break for the section measurement time specified in "Start Event:, End Event:" (time from the establishment of timer start event to the establishment of timer end event).

ON	A timeout break occurs (execution is terminated) if the section measurement time exceeds the specified timeout time. Specify the time-out time in the text boxes. The values up to the maximum measurable time can be specified.
OFF	No timeout break occurs. (default)
Overflow	A timeout break occurs (execution is terminated) if the section measurement time exceeds the maximum measurable time (refer to "Table 6-16 Measurable Values").

Remark: In the case of a Run-Break event, this area is fixed to the "OFF" position and disabled.

(4) Event manager area

This area displays the list of registered events.

Each event condition can be set easily just by dragging and dropping the event icon displayed in this area onto the event setting area in each event setting dialog box. (Refer to "5.12.3 Setting event conditions".)

This area is common to all event-related dialog boxes. (Refer to "(2) Event manager area" in the " Break Dialog Box".)

(5) Function buttons (for event condition contents display, etc.)

These buttons are used to display or delete the event conditions displayed in the event condition setting area, and to display or hide the Event manager area. This area is common to all event-related dialog boxes.(Refer to "(3) Function buttons (for event condition contents display, etc.)" in the " Break Dialog Box".)

(6) Function buttons (for registering, deleting, validating, and invalidating event conditions)

These buttons are used to register, delete, validate, and invalidate the events.

The event with the specified event condition is registered or set (validated) by clicking the <OK> (or <Set>) button. This area is common to all event-related dialog boxes. (Refer to "(4) Function buttons (for registering, deleting, validating, and invalidating event conditions)" in the " Break Dialog Box".)

Timer Result Dialog Box

[IECUBE]

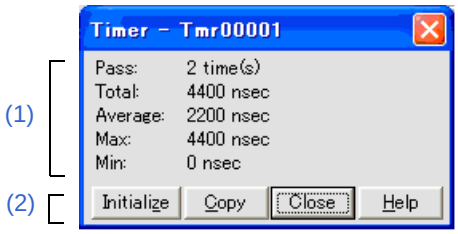
This dialog box displays the results of measuring the execution time. (Refer to "5.9 Timer Function [IECUBE]".)

By clicking the <View Always> button in the Timer Dialog Box, this dialog box is opened corresponding to a timer event condition on a one-to-one basis. Two or more of this dialog box can be simultaneously opened.

Up to 256 + 1 (Run-Break event) Timer Result Dialog Boxes can be opened, the number of events that can be measured at the same time is the number of valid events described in "5.12.4 Number of enabled events for each event condition" + 1 (Run-Break event).

Remark: The measurement result display contents are updated at each sampling time of the RRM Function, even during user program execution.

Figure 6-47 Timer Result Dialog Box



- Opening
- Explanation of Each Area

Opening

Select a timer event condition in the Timer Dialog Box , click the <View Always> button.

Explanation of Each Area

(1) Execution time display area

Same area is Timer Dialog Box.

Pass:	Number of passes
Total:	Total execution time in the measurement zone specified by start event and end event conditions
Average:	Average execution time
Max:	Maximum execution time
Min:	Minimum execution time

(2) Function buttons

Initialize	Clears the measurement results.
Copy	Copies the measurement result to the clipboard in text format.
Close	Closes this dialog box.
Help	Displays this dialog box online help files.

Trace View Window

[IECUBE]

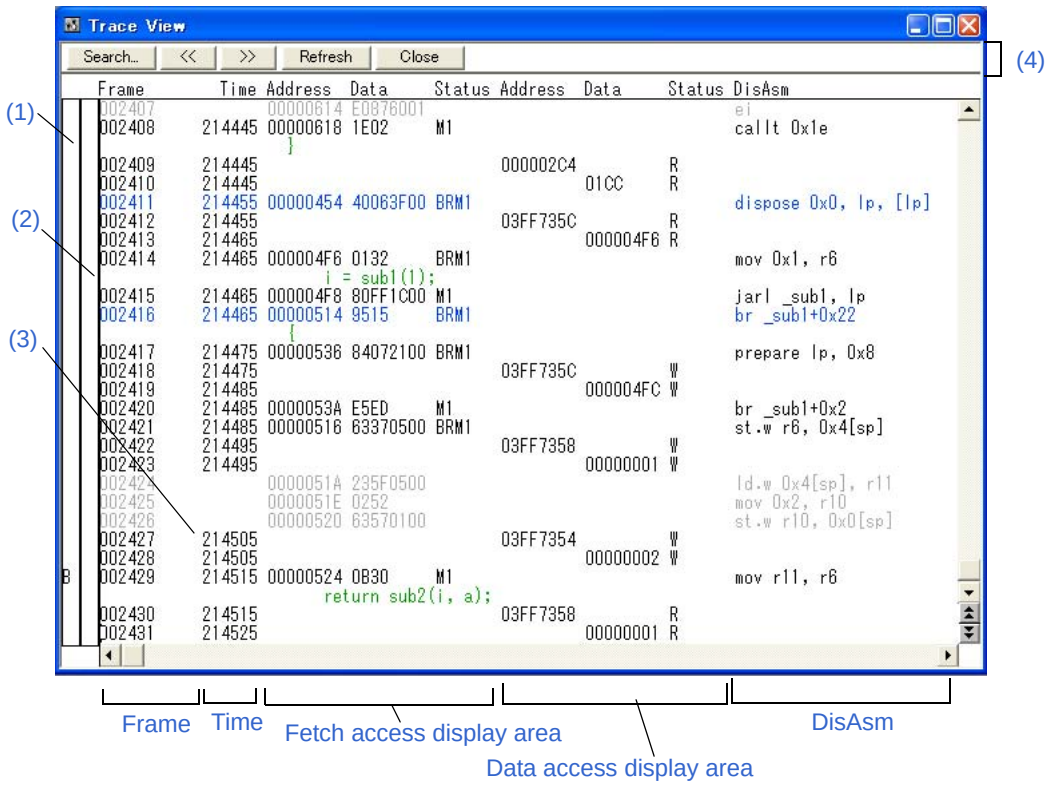
This window used to display the trace results. (Refer to "5.10 Trace Function [IECUBE]".)

Display updates are performed during breaks or during step execution.

This window has Mixed display mode (Trace View Window). Also, It has "5.16.3 Trace result with linking window [IECUBE]".

Other operations using Context Menu, Function buttons, etc., can be performed in this window.

Figure 6-48 Trace View Window



- Opening
- Explanation of Each Area
- [View] Menu (Trace View Window-dedicated items)
- Context Menu

Opening

Click the **TrW** button, or select [Browse] menu -> [Trace].

Explanation of Each Area

(1) Point mark display area

This area displays the Event Setting Status (Event Mark).

If an execution event or access event is set at the corresponding trace address, the mark corresponding to the type of the event is displayed.

The mark displayed is not that during trace but an event mark that is set when the trace result is displayed.

(2) Trace mode display area

This area displays the type of tracer mode.

A	A start or an end frame (section trace or qualify trace)
T	Delay trigger frame
M	DMA point access frame (DMA start point and end point) (Refer to "5.10.7 DMA point trace function".)
N	Frame for which not all the trace data was fetched

(3) Trace result display area

This area displays the trace results.

Complement frames are displayed in gray.

In complement frames, "Frame", "Fetch access display area", and "DisAsm" are displayed only.

Whether each of the following sub-areas is displayed or not can be selected in the Trace Data Select Dialog Box.

Frame	This area displays the trace flame number.
Time	This area displays the number of clocks required for the target chip from the execution start of the program to the execution start of an instruction of each frame or generation of memory access cause. In complement frames, this area is not displayed. The display contents can be switched between clock count display and time display in the Trace Data Select Dialog Box. For the relationship between the timer count division ratio and maximum measurement time, refer to "Table 6-5 Relationship Between Time Tag Counter Division Ratio and Maximum Measurement Time (Time tag counter (Trace))". The timetag and time measurement are performed using an external clock (50MHz). **Note:** If overflow occurs, the time tag maximum value is displayed in red.
Fetch access display area	This area displays the result of fetching the program. In the case of a complement frame, only "Address" and "Data" are displayed.

Address	Displays the fetch address	
Data	Displays the fetch data	
Status	The following types of statuses are available:	
	BRM1	Fetching of first byte of first instruction after branch. (The frame which is BRM1 and is also M1 is included.) If the fetch address is the start of the symbol, the first line is highlighted in blue.
	M1	Fetching of first byte of instruction
	Blank	Any of the following - Data access frame (3 frames max. (2 frames max when RRM function is selected.)) - Frame of the second instruction (when two instructions are executed at the same time) - Invalid flame
	IF	Fetch address that entered interrupt and was canceled (The address where the breakpoint was set and this correspond.)
	INFO	Trace start (delay trigger trace), traces start/trace end (section trace), Fetch address (qualify trace start/end)
Data access display area	This area displays the result of accessing data. In complement frames, this area is not displayed.	
Address	Displays access address	
Data	Displays access data	
Status	Displays access status	
	R	Data read
	W	Data write
DisAsm	This area displays the disassemble results.(only when "Status" is BRM1, M1, or complement frames). For the frame that only displays access addresses, global symbols are displayed instead.	

Remark1: When a 6-byte or 8-byte instruction code is displayed, the first 4 bytes are displayed in the first frame, and the other bytes are displayed in the second and third frames. If two instructions are executed at the same time, one frame is displayed on two lines. The instruction code at the lower address is displayed on the first line and the instruction code at the higher address is displayed on the second line.

Remark2: To display instruction codes when two instructions are simultaneously executed, one instruction is displayed on the first line, and the other instruction is displayed on the second line.

(4) Function buttons

Search...	Opens the Trace Search Dialog Box and searches trace results. The searched result will be highlighted in the Trace View Window. Same function as [View] menu -> [Search...].
<<	Searches forward (upward on screen) for a trace result that satisfies the search condition set in the Trace Search Dialog Box.
>>	Searches backward (downward on screen) for a trace result that satisfies the search condition set in the Trace Search Dialog Box.
Refresh	Updates the contents of the window with the latest data.
Close	Closes this dialog box.

[View] Menu (Trace View Window-dedicated items)

The following items are added in the [View] menu, when the Trace View Window is active.

Select...	Selects the contents to be displayed. Opens the Trace Data Select Dialog Box.
Mix	Switches whether to display the source file in mixed display mode. Selected: Mixed display Cleared: Hidden (default)
Window Synchronize	Links the Trace View Window with the following windows: (Refer to "5.16.3 Trace result with linking window [IECUBE]".) A selected window is linked.
Source Text	Links the Source Window.
Assemble	Links the Assemble Window.
Memory	Links the Memory Window.

Context Menu

Move...	Moves the display position. Opens the Trace Move Dialog Box.
Trace Clear	Clears the trace data.
Select...	Selects the contents to be displayed. Opens the Trace Data Select Dialog Box.
Mix	Switches whether to display the source file in mixed display mode. Selected: Mixed display Cleared: Hidden (default)
Window Synchronize	Links the Trace View Window with the following windows: (Refer to "5.16.3 Trace result with linking window [IECUBE]".)
Source Text	Links the Source Window.
Assemble	Links the Assemble Window.
Memory	Links the Memory Window.

Source Text	Displays the corresponding source text and source line, using the data value at the cursor position as the jump destination address. (Refer to "5.16.2 Jump function".) If no line information exists at the jump destination address, however, you cannot jump. Opens the Source Window. If the Source Window in active is open, that window is displayed in the forefront (so that it can be manipulated).
Assemble	Disassembles and displays starting from the jump destination address specified by the data value at the cursor position. (Refer to "5.16.2 Jump function") Opens the Assemble Window. If the Assemble Window in active is open, that window is displayed in the forefront (so that it can be manipulated).
Memory	Displays the memory contents starting from the jump destination address specified by the data value at the cursor position. (Refer to "5.16.2 Jump function") Opens the Memory Window. If the Memory Window in active is open, that window is displayed in the forefront (so that it can be manipulated).

Trace Search Dialog Box

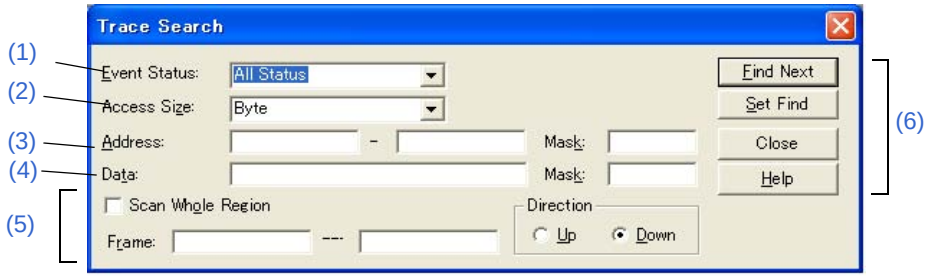
[IECUBE]

This dialog box is used to search in the Trace View Window. (Refer to "5.10 Trace Function [IECUBE]".)

By setting each item and then clicking the <Find Next> button, searching can be started.

By clicking the <Set Find> button, the direction buttons (<< and >>) in the Trace View Window can be used for the search.

Figure 6-49 Trace Search Dialog Box



- Opening
- Explanation of Each Area

Opening

When the Trace View Window is the current window, select [View] menu -> [Search...], or click the <Search... > button in the same window.

Explanation of Each Area

(1) Event Status:

This area is used to select a status condition.

If a status condition is omitted, all frames (All status) are searched.

Remark: The IF and INFO frames are not searched.

All Status	All frames (default)
M1 Fetch	M1 fetch (including BRM1 Fetch)
R/W	Data read/write (including Read, Write)
Read	Data read
Write	Data write

(2) Access Size:

This area is used to select an access size condition.

By specifying an access size condition, the access width of a data condition to be detected by an access event is determined.

Byte	Searches for a data condition with 8-bit width (only during 8-bit access).
Half Word	Searches for a data condition with 16-bit width (only during 16-bit access).
Word	Searches for a data condition with 32-bit width (only during 32-bit access).
No Condition	Does not search based on access size (nothing can be input to "Data" area).
Bit	Searches for a data condition with 1-bit width (only during 8-bit access)**Note1,2**

Note1: If an access event is specified as a status condition, the alternative of Bit is not displayed. If Bit or 1 is specified, an error occurs.

Note2: In this case, a search is made for a data condition with 1-bit width. Because of the operation of the simulator, access to a bit is not directly detected; the simulator searches a dummy bit access by internally setting address conditions and data conditions as follows:

Input example:		Setting of trace search:
Address: 3FF7000.1	->	Address: 3FF7000
Data: 1		Data: 00000010B
		Mask: 11111101B

If another bit of the same address is accessed or if all the 8 bits of the same address are accessed, therefore, a trace data is searched in accordance with the specified status if the address and bit match the specified value of [address.bit].

Remark: If no access size condition is specified, a judgment is automatically made from the address condition and data condition, and the following is set:

- Bit, if the address condition is set in bit units
- Byte, if the data condition is set in 8-bit units
- Half Word, if the data condition is set in 16-bit units
- Word, if the address condition is set in 32-bit units
- No Condition, if no data condition is specified

(3) Address condition setting area

This area is used to specify an address condition (may be omitted). The following can be set:

Table 6-17 Settable Range of Address Condition (Trace)

Settable Range	Condition
0 <= address value <= 0xFFFFFFFF	None
0 <= mask value <= 0xFFFFFFFF	None

Address:	Set an address condition (lower address - higher address) (may be omitted). The default radix for inputting a numeric value is hexadecimal. A symbol can be also specified by a symbol or expression. (Refer to "Table 5-6 Specifying Symbols".) The following can be set:	
	Setting as a point	Set a value to only the lower address, or set the same value to the lower address and the higher address.
	Setting as a range	Set a value to only the lower address, or set the same value to the lower address and the higher address.
	Setting as a bit	Set a value to only the lower address, or set the same value to the lower address and the higher address. Specify a value in the form of "address.bit". Mask cannot be set. The value of bit, which indicates the bit position, must be 0 <= bit<= 7.
Mask:	Set a mask value for an address value (only when "Setting as a point ") (may be omitted). The address value of a bit whose mask value is 1 may be 0 or 1.	

Example1: 0x4000 to 0x40FF satisfy the condition.

Address:	0x4000 to 0x4000
Mask:	0xFF

Example2: 0x4000, 0x4001, 0x4100, and 0x4101 satisfy the condition.

Address:	0x4000 to 0x4000
Mask:	0x101

(4) Data condition setting area

This area is used to set data conditions (may be omitted).

The settable range differs as follows depending on the access size condition specified in "(2) Access Size:". (Refer to "(5) Data condition setting area" in the " Event Dialog Box" .)

Data:	Set a data value as data conditions. The default radix for inputting a numeric value is hexadecimal. A data can be also specified by a symbol. (Refer to "Table 5-6 Specifying Symbols".)
Mask:	Set a mask value for the data value (may be omitted). When a mask is set, the data value for the bit whose mask value is 1 may be 0 or 1.

Example1: 0x4000 to 0x40FF satisfy the condition.

Data	0x4000
Mask	0xFF

Example2: 0x4000, 0x4001, 0x4100, and 0x4101 satisfy the condition.

Data	0x4000
Mask	0x101

(5) Search condition setting area

Scan Whole Region	This should be selected to search the entire specified range.	
Frame:	This area is used to specify a frame number to be searched. The default radix for inputting a numeric value is decimal. A symbol can be also specified by Frame Number Specification Format.	
Direction	This area is used to specify the direction of the search.	
	Up	Forward search. Searches data forward (upward on screen) from the current position of the cursor.
	Down	Backward search. Searches data backward (downward on screen) from the current position of the cursor. (default)

(6) Function buttons

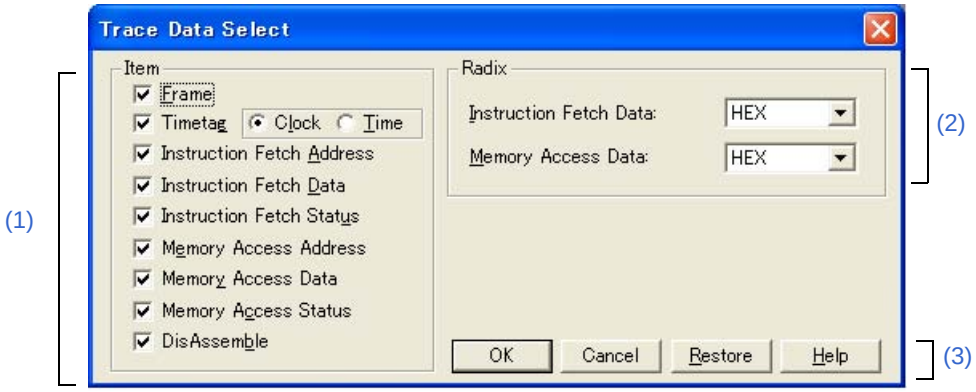
Find Next	Searches the specified data in accordance with a given condition. If the specified frame is found as a result of a search, it is highlighted. To continue searching, click this button again.
Set Find	Sets the specified condition as the search condition and closes this dialog box.
Close	Closes this dialog box.
Help	Displays this dialog box online help files.

Trace Data Select Dialog Box

[IECUBE]

This dialog box is used to select items to be displayed in the Trace View Window. (Refer to "5.10 Trace Function [IECUBE]".)

Figure 6-50 Trace Data Select Dialog Box



- Opening
- Explanation of Each Area

Opening

When the Trace View Window is the current window, select [View] -> [Select...] menu.

Explanation of Each Area

(1) Item

This area is used to select items to be displayed in the Trace View Window. Displaying the following fields may or may not be selected. The field selected is displayed. (Refer to "(3) Trace result display area".)

Frame	Frame field
Timetag	Time field Whether the "Clock" or "Time" is displayed can be selected.
Instruction Fetch Address	Address (Fetch access display area) field
Instruction Fetch Data	Data (Fetch access display area) field
Instruction Fetch Status	Status (Fetch access display area) field
Memory Access Address	Address (Data access display area) field
Memory Access Data	Data (Data access display area) field
Memory Access Status	Status (Data access display area) field
DisAssemble	DisAsm field

(2) Radix

This area is used to select the radix in which data is to be displayed. Displaying the following items may or may not be selected.

Instruction Fetch Data:	Data (Fetch access display area) Field
Memory Access Data:	Data (Data access display area) Field

HEX	Displays hexadecimal numbers. (default)
DEC	Displays decimal numbers.
OCT	Displays octal numbers.
Bin	Displays binary numbers.

(3) Function buttons

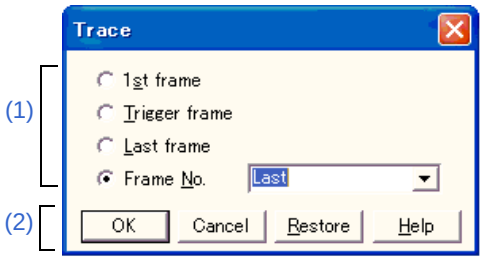
OK	Reflects the results of selection in this dialog box in the Trace View Window.
Cancel	Closes this dialog box.
Restore	Restores the original status.
Help	Displays this dialog box online help files.

Trace Move Dialog Box

[IECUBE]

This dialog box is used to specify the position from which displaying the Trace View Window is started. (Refer to "5.10 Trace Function [IECUBE]".)

Figure 6-51 Trace Move Dialog Box



- Opening
- Explanation of Each Area

Opening

When the Trace View Window is the current window, select [View] menu -> [Move...].

Explanation of Each Area

(1) Frame selection area

This area is used to specify the frame at the destination.

1st frame	Moves the display start position to a first frame of trace data.
Trigger frame	Moves the display start position to the trigger frame of trace data.
Last frame	Moves the display start position to the last frame of trace data.
Frame No.	Moves the display start position to the specified frame number. (Refer to "Table 6-18 Frame Number Specification Format".) In the default condition, the character string selected in the window that called this dialog box or "Last" is selected. The default radix for inputting a numeric value is decimal. If 0 is specified, the display start position is moved to the first frame of trace data. Up to 16 input histories can be recorded.

Table 6-18 Frame Number Specification Format

Specification	Abbreviation	Contents
+numeric value	None	Moves backward (downward on screen) the display start position from the frame at the cursor by the specified number of frames (numeric value).
-numeric value	None	Moves forward (upward on screen) the display start position from the frame at the cursor by the specified number of frames (numeric value).
Top	O	Moves the display start position to the first frame.
First	S	Same as "1st frame"
Trigger	T	Same as "Trigger frame"
Last	L	Same as "Last frame"

(2) Function buttons

OK	Starts trace display from the specified position.
Cancel	Closes this dialog box.
Restore	Restores the input data to the original status.
Help	Displays this dialog box online help files.

Trace Dialog Box

[IECUBE]

This dialog box is used to register, set, and display trace event conditions. (Refer to "5.12 Event Function", "5.10 Trace Function [IECUBE]".)

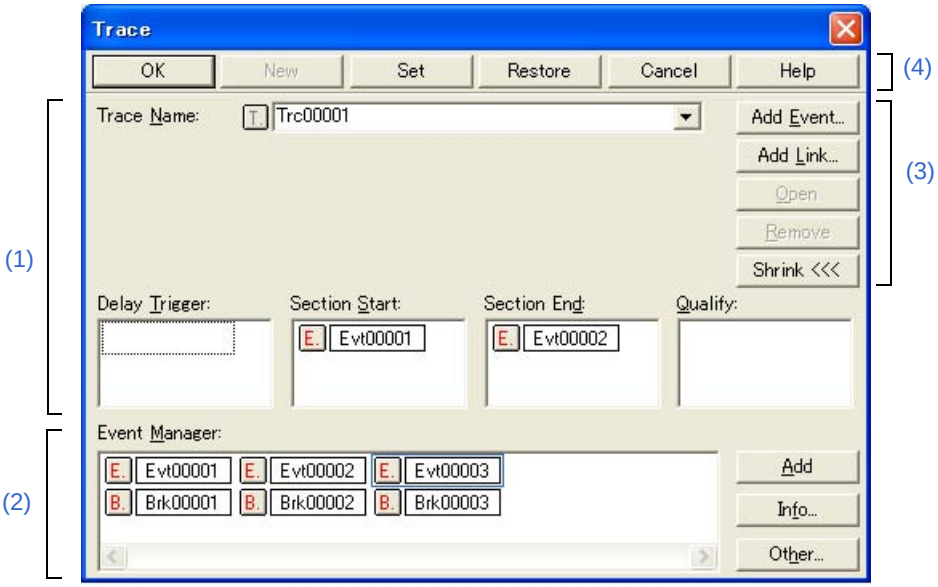
The trace event conditions for when performing conditional trace are specified in this dialog box. (Refer to "Table 5-13 Types of Conditional Trace".)

Registration and setting of trace event conditions is done by setting each item (256 items max.) in this dialog box and then clicking the <OK> button. The registered trace event conditions are managed by the Event Manager.

The number of trace event conditions that can be simultaneously used (validated) is limited. (Refer to "5.12.4 Number of enabled events for each event condition".)

Remark: Trace event condition setting/enable/disable/delete operations are possible even during user program execution. In this case, the tracer operation is momentarily stopped during manipulation.

Figure 6-52 Trace Dialog Box



- Opening
- Explanation of Each Area

Opening

Click the **Trc** button, or select [Event] menu -> [Trace...].

Explanation of Each Area

(1) Trace event condition setting area

Trace Name:	This area is used to set a trace event name. Directly input an alphanumeric string of up to eight characters as a name. To display the contents of an already created event condition, select from the drop-down list. The mark on the left of this area indicates the utilization status of events. (Refer to "Table 5-18 Event Icon".) The gray mark indicates that an event condition is being edited and has not been registered yet. By clicking the left mark, an event condition can be validated or invalidated.
Delay Trigger:	This area is used to set an event condition for a delay trigger. (Refer to "5.10.6 Setting conditional trace".) Event conditions are easily set by dragging the icon of the event to be set from the event manager area and dropping it in this area. For details, refer to "5.12.3 Setting event conditions". The number of event conditions that can be set in this area is refer to "Table 6-19 Number of Events Settable".
Section Start: Section End:	Event conditions are easily set by dragging the icon of the event to be set from the event manager area and dropping it in this area. For details, refer to "5.12.3 Setting event conditions". The number of event conditions that can be set in this area is refer to "Table 6-19 Number of Events Settable".
Qualify:	This area is used to set an event condition for a qualify trace. (Refer to "5.10.6 Setting conditional trace".) If two or more events are set, trace is performed when each event occurs. Event conditions are easily set by dragging the icon of the event to be set from the event manager area and dropping it in this area. For details, refer to "5.12.3 Setting event conditions". The number of event conditions that can be set in this area is refer to "Table 6-19 Number of Events Settable".

Table 6-19 Number of Events Settable

Connected IE	Event Conditions Total (execution/access)	Event Link Conditions
[IECUBE]	14 (8*a/6)	1

***a** Can be used to events after execution.

(2) Event manager area

This area displays the list of registered events.

Each event condition can be set easily just by dragging and dropping the event icon displayed in this area onto the event setting area in each event setting dialog box. (Refer to "5.12.3 Setting event conditions".)

This area is common to all event-related dialog boxes. (Refer to "(2) Event manager area" in the " Break Dialog Box".)

(3) Function buttons (for event condition contents display, etc.)

These buttons are used to display or delete the event conditions displayed in the event condition setting area, and to display or hide the Event manager area. This area is common to all event-related dialog boxes.(Refer to "(3) Function buttons (for event condition contents display, etc.)" in the " Break Dialog Box".)

(4) Function buttons (for registering, deleting, validating, and invalidating event conditions)

These buttons are used to register, delete, validate, and invalidate the events.

The event with the specified event condition is registered or set (validated) by clicking the <OK> (or <Set>) button. This area is common to all event-related dialog boxes. (Refer to "(4) Function buttons (for registering, deleting, validating, and invalidating event conditions)" in the " Break Dialog Box".)

Delay Count Dialog Box

[IECUBE]

This dialog box is used to set or display delay count values. (Refer to "5.10 Trace Function [IECUBE]".)

By setting a delay count value, a trace can be executed the number of times specified by the delay count value after the delay trigger event condition set in the Trace Dialog Box has been satisfied. (Refer to "5.10.6 Setting conditional trace".)

Figure 6-53 Delay Count Dialog Box

- Opening
- Explanation of Each Area

Opening

Select [Event] menu -> [Delay Count...].

Explanation of Each Area

(1)Delay count setting area

Delay Count	The following items can be selected.	
	FIRST	Places the trigger pointer at the first of the trace data, traces all frames, and then stops the tracer.
	MIDDLE	Places the trigger pointer at the center of the trace data, traces a half of all frames, and then stops the tracer.
	LAST	Places the trigger pointer at the end of the trace data and immediately stops the tracer.

Caution: The delay count value differs according to the trace memory size specified in the Extended Option Dialog Box.

Example: When the trace memory size is 256K frames,

FIRST: 256K - 1 frame

MIDDLE: (256K / 2) - 1 frame

LAST: 5 frames

(2) Function buttons

OK	Validates the settings and closes this dialog box.
Restore	Restores the previous settings.
Cancel	Closes this dialog box.
Help	Displays this dialog box online help files.

Code Coverage Window

[IECUBE]

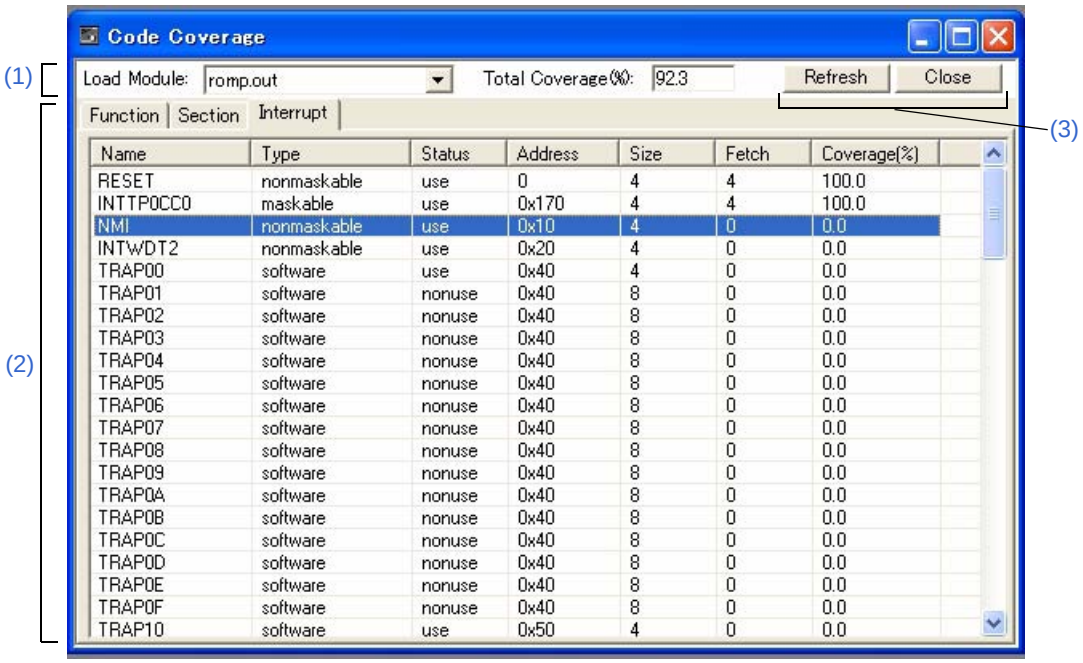
This dialog box displays the code coverage measurement result (C0 coverage). (Refer to "5.11 Coverage Measurement Function [IECUBE]".)

The lines where the user program has been executed or not yet executed can be checked in the Source Window or Assemble Window.

Caution: The coverage measurement result is inaccurate if the on-chip flash memory data is replaced via emulation of flash self programming. (Refer to " Flash Option Dialog Box".)

Remark: Coverage data is cleared when the ID850QB is started.

Figure 6-54 Code Coverage Window



- Opening
- Explanation of Each Area
- Context Menu

Opening

 Click the **Cov** button, or select [Browse] menu -> [Code Coverage].

Explanation of Each Area

(1) Coverage information display area

Load Module:	This area is used to select the load module file that has been downloaded. This area is blank when no load module file has been downloaded.
Total Coverage (%):	This area displays the coverage for the area for which code coverage has been measured. **Total coverage = Total executed (fetched) function size/total function size** (excluding sections outside the coverage measurement range) This area is blank when no load module file has been downloaded.

(2) Measurement result display area

This area displays the measurement result per tab (function, section, interrupt handler).

The coverage measurement result is updated automatically at a break (it is not updated during user program execution).

This area is blank when no load module file has been downloaded.

The display jumps from this tab to the Source Window or Assemble Window using the start address value of the selected line as a jump pointer. The jump destination window will be displayed from the jump pointer.

The jump function is executed by selecting a jump source line then selecting [Source Text/Assemble] in the [Jump] menu. Jump can also be performed by double-clicking the jump source line.

Remark: The displayed items are sorted by clicking the title (on the label) in each column (ascending/ descending order is switched each time the title is clicked).

(a) When [Function] tab is selected

Name	Function name (displayed as function in file units in case of assembler source file)
File	Name of file in which the function is defined
Address	Function start address
Size	Function size (unit: bytes)
Fetch	Number of bytes executed (fetched)
Coverage (%)	Coverage of the function (0 - 100%) ---- : When the function is outside the coverage measurement range

(b) When [Section] tab is selected

Name	Section name
Type	Section type (code, data)
Address	Section start address
Size	Section size (unit: bytes)

Fetch	Number of bytes executed (fetched)
Coverage [%]	Coverage of the section (0 - 100%) ---- : When the section is outside the coverage measurement range

(c) When [Interrupt] tab is selected

Name	Interrupt request name
Type	Interrupt type (nonmaskable, maskable, software, security id, flash mask option)
Status	Utilization status in the program ---- : Unknown
Address	Starting address of the interrupt handler
Size	Size of the interrupt handler (unit: bytes) Maximum size for statuses other than "use"
Fetch	Number of bytes executed (fetched)
Coverage [%]	Coverage of the interrupt handler (0 - 100%) ---- : When the interrupt handler is outside the coverage measurement range

(3) Function buttons

Refresh	Updates the contents of this window with the latest watch data.
Close	Closes this window.

Context Menu

Source Text	Displays the corresponding source text and source line, using the data value at the cursor position as the jump destination address. (Refer to "5.16.2 Jump function".) If no line information exists at the jump destination address, however, you cannot jump. Opens the Source Window. If an active Source Window is open, that window is displayed in the forefront (so that it can be manipulated).
Assemble	Disassembles and displays starting from the jump destination address specified by the data value at the cursor position. (Refer to "5.16.2 Jump function".) Opens the Assemble Window. If an active Assemble Window is open, that window is displayed in the forefront (so that it can be manipulated).
Clear	Clears the coverage measurement results.
Select...	Selects the coverage measurement range as a space of 1 MB or more. Opens the Coverage-Address Dialog Box.

Coverage-Address Dialog Box

[IECUBE]

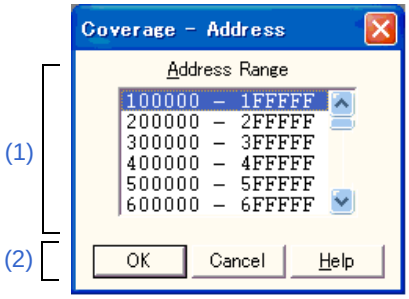
This dialog box is used to select the coverage measurement range to be displayed in the Code Coverage Window. (Refer to "5.11 Coverage Measurement Function [IECUBE]".)

The measurable ranges are given below. In this dialog box, any 1 MB range can be selected.

Table 6-20 Coverage Measurement Range (Detail)

Connected IE	Code Coverage Measurement Range
[IECUBE]	- 1 MB space of addresses 0x000000 to 0x0FFFFF(fixed measurement areas) - Any 1 MB space of addresses 0x100000 to 0x3FFFFFF (selectable by this daialog) (Default: 0x3F00000 to 0x3FFFFFF)

Figure 6-55 Coverage-Address Dialog Box



- Opening
- Explanation of Each Area

Opening

Select [Option] menu -> [Coverage] -> [Select...]

Explanation of Each Area

(1) Address selection area

Address Range	This is an area for selecting any 1 MB space that performs coverage measurement. Changing the measurement range clears the measurement result (coverage data) in the previously selected range, but does not clear the coverage data in the fixed measurement areas 0 to 0x0FFFFF. To determine the coverage measurement range, select the area, and click the <OK> button.

(2) Function buttons

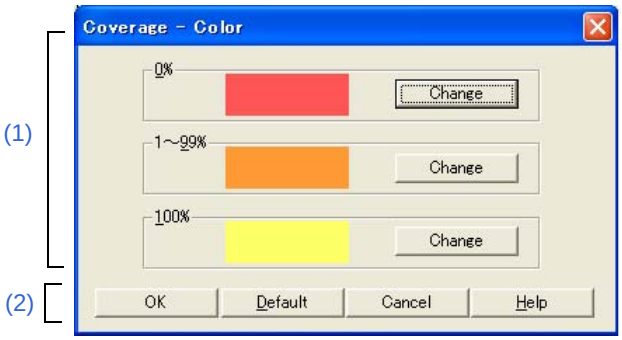
OK	Validates the coverage measurement range selected.
Cancel	Closes this dialog box.
Help	Displays this dialog box online help files.

Coverage-Color Dialog Box

[IECUBE]

This dialog box is used to select the color to distinguish the coverage of executed code displayed in the Source Window and Assemble Window (refer to "5.11.3 Display of locations for which coverage measurement is executed").

Figure 6-56 Coverage-Color Dialog Box



- Opening
- Explanation of Each Area

Opening

Click the <Color...> button in the Debugger Option Dialog Box.

Explanation of Each Area

(1) 0%, 1 ～ 99%, 100%

The current settings (colors) for coverage 0%, 1 to 99%, and 100% are displayed.

The color for coverage 0%, 1 to 99%, and 100% can be selected by clicking the <Change> button.

A Windows standard color setting dialog box is used for color specification.

(2) Function buttons

OK	Applies the settings to the Source Window or Assemble Window and closes this dialog box.
Default	Restores the default color for coverage.
Cancel	Closes this dialog box.
Help	Displays this dialog box online help files.

Software Break Manager

This window is used to display, enable or disable, and delete software breaks. (Refer to "5.4.4 Hardware break and software break".)

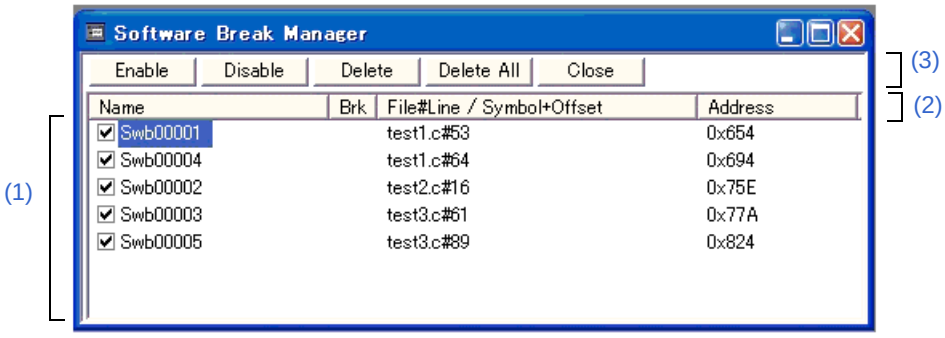
Software breakpoints cannot be set in this window; they can be set in the Source Window or Assemble Window. (Refer to "5.4.2 Breakpoint setting".)

Caution1: Software break points can be set or deleted while the user program is being executed. While the user program is being executed, software breaks can be set, deleted, enable or disable. The warning of a purport which makes a user program once take a break is displayed.

Caution2: When the Pseudo real-time monitor function (Break When Readout) is enabled, no software break points can be set.
In addition, if a valid software break point has been set, writing during user program execution (DMM Function) is disabled.

Remark: The displayed items are sorted by clicking the title (on the label) in each column (ascending/ descending order is switched each time the title is clicked).

Figure 6-57 Software Break Manager



- Opening
- Explanation of Each Area

Opening

Select [Event] menu -> [Software Break Manager].

Explanation of Each Area

(1) Break information display area

Name	This area displays the names of registered events, and the checkboxes that indicate whether each event is enabled or disabled. An event name is displayed in the form of "Swb+[number]" in the default condition. It can be changed to an alphanumeric string of up to 256 characters. To change an event name, select and click a name. Then directly edit the name. To set the editing, press the Enter key. When an event is enabled, the checkbox is selected. To be disable, the checkbox is not selected. Furthermore, the name jumps to the Source Window by double-clicking an event name if the event name corresponds to the source line, whereas the name jumps to the Assemble Window if it does not correspond to the source line.
Brk	The ">" mark is displayed for a software break event that is set at the current PC position (so that the software break event that caused a break can be easily identified).
File#Line / Symbol+Offset	This area displays the location at which a software break event was set as follows: **Program$file name#line number** (If the event corresponds to the source line.) **Program$file name#symbol+offset** (If the event dose not correspond to the source line.) Events are evaluated based on this when a symbol is re-downloaded.
Address	This area displays the address at which a software break event is set.

(2) Item label area

The displayed items are sorted by clicking each item label (ascending/descending order is switched each time the label is clicked).

Name	Sorts the character strings in alphabetic order (ascending/descending order)
Brk	Does not sort
File#Line / Symbol+Offset	Sorts the character strings in alphabetic order (ascending/descending order)
Address	Sorts the addresses based on higher/lower (ascending/descending order)

(3) Function buttons

Enable	Enables the selected event.
Disable	Disables the selected event.
Delete	Deletes the selected event.
Delete All	Deletes all the set software break events.
Close	Closes this window.

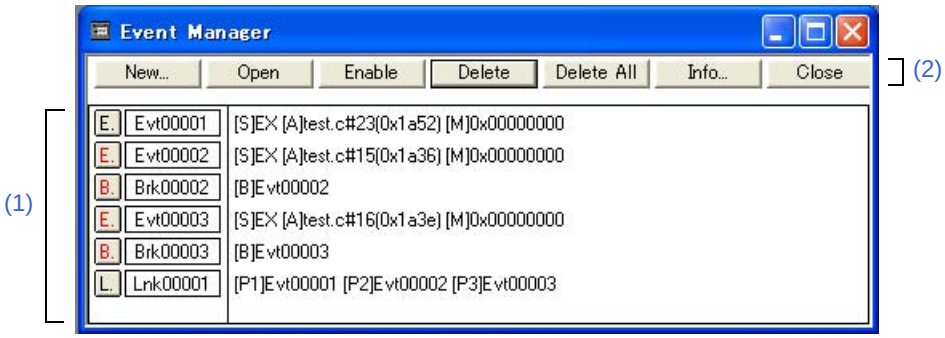
Event Manager

This window is used to manage event conditions. This window allows display, enabling/disabling, and deletion of the Various Event Conditions. (Refer to "5.12 Event Function".)

Other operations using Context Menu, Function button, etc., can be performed in this window.

The event icon is the jump pointer of the Jump function.

Figure 6-58 Event Manager (In Detailed Display Mode)



- Opening
- Explanation of Each Area
- [View] Menu (Event manager-dedicated items)
- Context Menu

Opening

 Click the **Mgr** button, or select [Event] menu -> [Event Manager].

Explanation of Each Area

(1) Event display area

This area displays the icons (event icons) of the registered Various Event Conditions.
By selecting the context menu -> [Detail], the details can be displayed.

[In list displayed]	 Displays event icon. (Refer to "Table 5-18 Event Icon".) The event icon is the jump pointer. (Refer to "5.16.2 Jump function".)

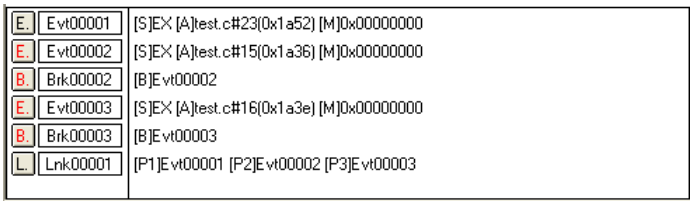
[In detailed display]	 Details of event contents are displayed by using the following key information as a separator. (Refer to "Table 6-21 Separator for Displaying Event Details".)

Table 6-21 Separator for Displaying Event Details

Key Information	Contents
Event condition	
[S]	Status condition
[Z]	Access size condition
[A]	Address condition Symbol or expression: (actual address)
[D]	Data condition Symbol or expression: (actual address)
[M]	Mask condition
Event link condition	
[P1] - [P4]	Event link condition on "n" th line
[D]	Disable condition
[P]	Pass count condition
Break condition	
[B]	Break condition
Trace condition [IECUBE]	
[M]	Tracer control mode
[T]	Delay trigger condition
[D]	Delay Count
[S]	Trace start condition
[E]	Trace end condition
[Q]	Qualify trace condition
Timer condition [IECUBE]	
[S]	Timer measurement start condition
[E]	Timer measurement end condition
[U]	Timer measurement unit
[B]	Timeout break condition

(2) Function button

OK	Automatically registers the event condition being edited, if any, and closes this dialog box. Each event condition becomes valid as soon as it has been registered.	
New...	Opens the [New Event] Dialog Box.	
		Opens the dialog box to create new event condition. By clicking each button, the corresponding event setting dialog box can be opened with the new event name set. After the event setting dialog box has been opened, this dialog box is closed. Returns to Event Manager by clicking the <Cancel> button.
Set	Registers the various event conditions. Because the dialog box is not closed even after an event has been registered, new event conditions can be registered. Each event condition becomes valid as soon as it has been registered.	
Open	Opens the various event setting dialog box corresponding to the selected event condition (one). Each setting dialog box displays the contents of the selected event condition. Same operation as double-clicking the event icon or pressing the Enter key.	
Enable Disable	Validates (enables) or invalidates (disables) the selected event condition. However, event conditions and event link conditions cannot be enabled or disabled. Same operation as the clicking the mark of event icon.	
Remove	Deletes the selected event. When an event condition or an event link condition is to be deleted, an error occurs and the event condition or event link condition cannot be deleted if the event is used as a various event condition.	
Delete All	Deletes all event conditions.	
Info...	Opens the [Event Info] Dialog Box. This dialog box is used to change the display mode and rearrange event names.	
		<Sort by Name> ..... Sorts events into name order. <Sort by Kind>..... Sorts events into type order. <Unsort>..... Displays events in the order in which they have been registered without sorting the events. <Detail> ..... Sets the detailed display mode. <Overview> ..... Sets the list display mode. <Cancel> ..... Closes this dialog box (same as ESC key).
Close	Closes this dialog box.	

[View] Menu (Event manager-dedicated items)

The following items are added in the [View] menu , when the Event Manager is active.

Select All Event	Selects all the registered events.
Delete Event	Deletes a selected event.
Sort By Name	Displays icons in the order of event names.
Sort By Kind	Displays icons in the order of event types.
Unsort	Does not sort icons. (default)
Detail	Displays the details.
Overview	List display (default)

Context Menu

Sort By Name	Displays icons in the order of event names.
Sort By Kind	Displays icons in the order of event types.
Unsort	Does not sort icons. (default)
Detail	Displays the details.
Overview	List display (default)
Source Text	Displays the corresponding source text and source line, using the position of the selected event as the jump destination address. (Refer to "5.16.2 Jump function".) If no line information exists at the jump destination address, however, you cannot jump. Opens the Source Window. If an active Source Window is open, that window is displayed in the forefront (so that it can be manipulated).
Assemble	Displays the Assemble window from the position of the selected event, which is used as the jump destination address. (Refer to "5.16.2 Jump function".) Opens the Assemble Window. If an active Assemble Window is open, that window is displayed in the forefront (so that it can be manipulated).
Memory	Displays the memory contents from the position of the selected event, which is used as the jump destination address. (Refer to "5.16.2 Jump function".) Opens the Memory Window. If an active Memory Window is open, that window is displayed in the forefront (so that it can be manipulated).

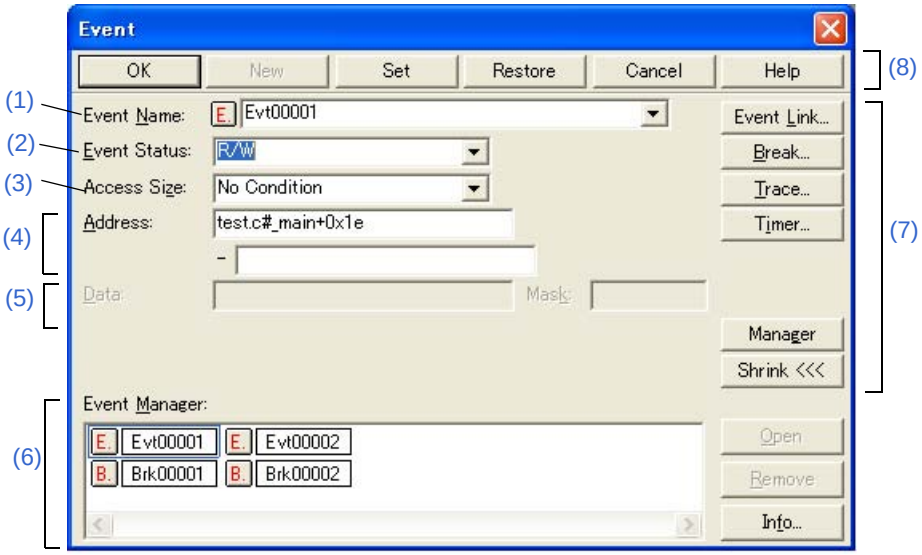
Event Dialog Box

This dialog box is used to register and display event conditions. (Refer to "5.12 Event Function".)

Setting of event conditions is done by setting each item in this dialog box and then pressing the <OK> button. The registered event conditions are managed by the Event Manager.

One event condition can be set for multiple Various Event Conditions. However, the number of event conditions that can be simultaneously used is limited. (Refer to "5.12.4 Number of enabled events for each event condition".)

Figure 6-59 Event Dialog Box



- Opening
- Explanation of Each Area

Opening

In normal mode

If the Event Dialog Box is opened as follows, an event condition can be registered without its purpose being specified.

 Click the **Evn** button, or select [Event] menu -> [Event...].

In select mode

If the <OK> button is pressed when the Event Dialog Box has been opened as follows, an event condition can be registered in the setting dialog box from which this dialog box was opened (the setting dialog box from which the this box was opened is displayed on the title bar.).

In each various event setting dialog box, click the <Add Event... > button.

Explanation of Each Area

(1) Event Name:

This area is used to set an event name.

Directly input an alphanumeric string of up to eight characters as a name.

To display the contents of an already created event condition, select from the drop-down list.

In the select mode, the selected event condition can be set in the event condition setting area of the setting dialog box that called the Event Dialog Box.

The mark on the left of this area indicates the utilization status of events. (Refer to "Table 5-18 Event Icon".) The gray E. mark indicates that the event condition is being edited and has not been registered yet.

(2) Event Status:

The status conditions that can be specified are listed below.

This area is used to select a status condition.

By specifying a status condition, the type of the execution event and an access event is determined (if an execution event is specified, nothing can be input to the "Access Size:" and "Data:, Mask:").

Execution event		
Execution	EX	Program execution
Before Execution	EX-B	Program execution (break before execution) **Note1**
Access event		
R/W	RW	Data read/write
Read	R	Data read
Write	W	Data write
R/W(Data not Equal)	RWND	Data read/write (An event occurs only if a data condition is not satisfied.)**Note2**
Read(Data not Equal)	RND	Data read (An event occurs only if a data condition is not satisfied.)**Note2**
Write(Data not Equal)	WND	Data write (An event occurs only if a data condition is not satisfied.)**Note2**

Note1: Multiple items can be specified, but only two items, including access events, can be enabled.
The address range cannot be specified. Can be used only for break event conditions.

Note2: In this case, data condition can not be omitted.
For access size condition, "No Condition" and "Bit" can not be selected.

(3) Access Size:

This area is used to select an access size condition.

By selecting an access size condition from the drop-down list, the access width of a data condition to be detected by an access event is determined.

If no access size condition is specified, a judgment is automatically made from the address condition and data condition.

Byte	Detects data condition with 8-bit width (only during 8-bit access).
Half Word	Detects data condition with 16-bit width (only during 16-bit access).
Word	Detects data condition with 32-bit width (only during 32-bit access).
No Condition	Does not detect access size (nothing can be input to the Data area).
Bit	Detects data condition with 1-bit width (only during 8-bit access)**Note**.

Note: In this case, a search is made for a data condition with 1-bit width. Because of the operation of the emulator, access to a bit is not directly detected; the simulator searches a dummy bit access by internally setting address conditions and data conditions as follows:

Input example:		Setting of emulator:
Address: 3FF7000.1	->	Address: 3FF7000
Data: 1		Data: 00000010B
		Mask: 11111101B

If another bit of the same address is accessed or if all the 8 bits of the same address are accessed, therefore, an event is detected in accordance with the specified status if the address and bit match the specified value of [address.bit].

(4) Address condition setting area

This area is used to specify an address condition (may be omitted).

The following can be set:

Table 6-22 Settable Range of Address Condition (Event)

Connected IE	Settable Range
[IECUBE] **[MINICUBE]**	0 <= address value <= 0xFFFFFFFF

Address:	Set an address condition (lower address - higher address) (may be omitted). The default radix for inputting a numeric value is hexadecimal. A symbol can be also specified by a symbol or expression. (Refer to "Table 5-6 Specifying Symbols".) The following can be set:	
	Setting as a point	Set a value to only the lower address, or set the same value to the lower address and the higher address.
	Setting as a range	Set a value to only the lower address, or set the same value to the lower address and the higher address.
	Setting as a bit	Set a value to only the lower address, or set the same value to the lower address and the higher address. Specify a value in the form of "address.bit". Mask cannot be set. The value of bit, which indicates the bit position, must be 0 <= bit<= 7.

Caution: Specify a 28-bit address, since physical address and image space are distinguished in setting event.

(5) Data condition setting area

This area is used to specify an data condition (data value, mask value).

The default radix for inputting a numeric value is hexadecimal.

The settable range differs as follows depending on the access size condition specified in "Access Size:".

Data:	This area is used to specify an data condition (data value, mask value). The default radix for inputting a numeric value is hexadecimal. The settable range differs as follows depending on the access size condition specified in "Access Size:".	
	Byte	0 <= data value <= 0xFF 0 <= mask value <= 0xFF
	Half Word	0 <= data value <= 0xFFFF 0 <= mask value <= 0xFFFF
	Word	0 <= data value <= 0xFFFFFFFF 0 <= mask value <= 0xFFFFFFFF
	Bit	Data value = 0 or 1 Mask value = Cannot be specified.
Mask:	Set a mask value for the data value (may be omitted). When a mask is set, the data value for the bit whose mask value is 1 may be 0 or 1.	

Example1: 0x4000 to 0x40FF satisfy the condition.

Data	0x4000
Mask	0xFF

Example2: 0x4000, 0x4001, 0x4100, and 0x4101 satisfy the condition.

Data	0x4000
Mask	0x101

(6) Event manager area

Event manager:	This area is used to display the list of the events registered. (Refer to "Table 5-18 Event Icon", "(4) Manipulation in event manager area".)
<Open>	Opens the various event setting dialog box corresponding to the selected event condition (one). Each setting dialog box displays the contents of the selected event condition. Same operation as double-clicking the event icon or pressing the Enter key.
<Remove>	Deletes the selected event. When an event condition or an event link condition is to be deleted, an error occurs and the event condition or event link condition cannot be deleted if the event is used as a various event condition.
<Info...>	Opens the [Event Info] Dialog Box. This dialog box is used to change the display mode and rearrange event names.

<Sort by Name> ..... Sorts events into name order.
<Sort by Kind>..... Sorts events into type order.
<Unsort>..... Displays events in the order in which they have been registered without sorting the events.
<Detail> ..... Sets the detailed display mode.
<Overview> ..... Sets the list display mode.
<Cancel> ..... Closes this dialog box (same as ESC key).

(7) Function buttons (for event condition contents display, etc.)

Event Link... Break... Trace... Timer...	By clicking each button, the corresponding event setting dialog box can be opened with the new event name set.
Manager...	Opens the Event Manager.
Expand >>> Shrink <<<	Turns on or off display of the event manager area. The size of the dialog box is expanded or reduced.

(8) Function buttons (for registering, deleting, validating, and invalidating event conditions)

These buttons are used to register, delete, validate, and invalidate the events.

The event with the specified event condition is registered or set by clicking the <OK> (or <Set>) button. This area is common to all event-related dialog boxes. (Refer to "(4) Function buttons (for registering, deleting, validating, and invalidating event conditions)" in the " Break Dialog Box".)

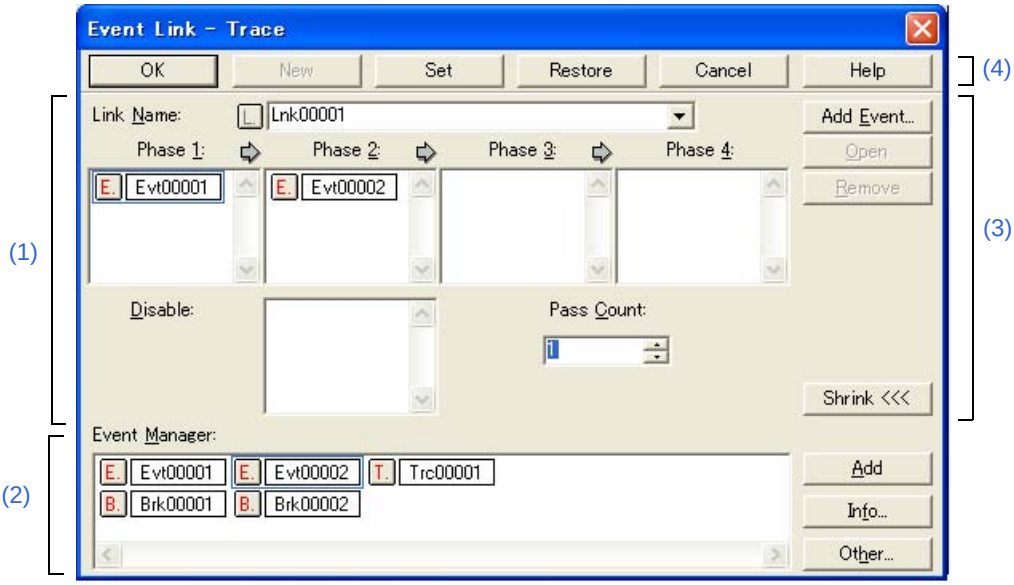
Event Link Dialog Box

This dialog box is used to register and display event link conditions. (Refer to "5.12 Event Function".)

Registration of event link conditions is done by setting each item (256 items max.) in this dialog box and then pressing the <OK> button. The registered event link conditions are managed by the Event Manager.

However, the number of event link conditions that can be simultaneously used is limited ("5.12.4 Number of enabled events for each event condition").

Figure 6-60 Event Link Dialog Box



- Opening
- Explanation of Each Area

Opening

In normal mode

If the Event Link Dialog Box is opened as follows, an event link condition can be registered without its purpose being specified.

Select [Event] menu -> [Event Link...].

In select mode

If the <OK> button is pressed when the Event Link Dialog Box has been opened as follows, an event link condition can be registered in the setting dialog box from which this dialog box was opened.

In each various event setting dialog box, click the <Add Link... > button.

(the setting dialog box from which the Event Link Dialog Box was opened is displayed on the title bar.)

Explanation of Each Area

(1) Event link condition setting area

Link Name:	Directly input an alphanumeric string of up to eight characters as a name. To display the contents of an already created event link condition, select from the drop-down list. In the select mode, the selected event condition can be set in the event link condition setting area of the setting dialog box that called the Event Link Dialog Box. The mark on the left of this area indicates the utilization status of event link conditions ("Table 5-18 Event Icon"). The mark "L" in gray indicates that an event link condition is being edited and has not been registered yet.
Phase 1: Phase 2: Phase 3: Phase 4:	This area is used to specify the sequence in which event conditions and events are detected. Up to four sequences can be specified. If a disable condition is detected while the program is being executed, however, the event conditions that have so far been satisfied are initialized, and the event conditions are detected again starting from the first event condition. If a link condition and a disable condition are detected at the same time, the disable condition takes precedence. Set "Phase 1" -> "Phase 2" -> "Phase 3" -> "Phase 4", in that order. "Phase 4" does not have to be set. In this case, an event occurs when the event condition set for the last phase has been detected. An event condition can be set for only "Phase 1" or the same event condition can be set for two or more Phases. The number of event conditions that can be set to each phase of this area and while the dialog box, refer to "Table 6-23 Number of Event Conditions in Event Link Dialog Box". Setting of event conditions is easily done by dragging the icon of the event to be set from the event manager area and dropping it in this area. For details, refer to "5.12.3 Setting event conditions".
Disable:	This area is used to set an event condition that invalidates the event conditions that have so far been satisfied. The number of event conditions that can be set to this area and while the dialog box, refer to "Table 6-23 Number of Event Conditions in Event Link Dialog Box". Setting of event conditions is easily done by dragging the icon of the event to be set from the event manager area and dropping it in this area. For details, refer to "5.12.3 Setting event conditions".
Pass Count: **[IECUBE]**	This area is used to set a pass count condition. A pass count condition specifies how many times an event condition must be satisfied during user program execution before a given condition is satisfied. If no pass count is specified, 1 is assumed (the condition is satisfied as soon as the event condition is satisfied).

Table 6-23 Number of Event Conditions in Event Link Dialog Box

Connected IE		Each Area	Total (Execution/Access)
[IECUBE]		10	14 (8/6)
[MINICUBE]	Nx85ET （RCU0+TEU+TRCU）	10***a**	12 (8/4)
	Nx85E901（RCU0），RCU1	1***b**	2***c**
[MINICUBE2]	With debug function	1***b**	2***c**
	Without debug function	-	-

***a** Can be set in Phase1-4 (expect before execution)

***b** Can be set only in Phase 1 and Phase 2 (must always be set in two stages)

***c** Only events before execution

(2) Event manager area

This area displays the list of registered events.

Each event condition can be set easily just by dragging and dropping the event icon displayed in this area onto the event setting area in each event setting dialog box. (Refer to "5.12.3 Setting event conditions".)

This area is common to all event-related dialog boxes. (Refer to "(2) Event manager area" in the " Break Dialog Box".)

(3) Function buttons (for event condition contents display, etc.)

These buttons are used to display or delete the event conditions displayed in the event condition setting area, and to display or hide the Event manager area. This area is common to all event-related dialog boxes.(Refer to "(3) Function buttons (for event condition contents display, etc.)" in the " Break Dialog Box".)

(4) Function buttons (for registering, deleting, validating, and invalidating event conditions)

These buttons are used to register, delete, validate, and invalidate the events.

The event with the specified event condition is registered by clicking the <OK> (or <Set>) button.

OK	Automatically registers the event condition being edited, if any, and closes this dialog box. **In the select mode** An event condition is selected and the setting dialog box (indicated on the title bar) that called the Event Link dialog box is displayed again. If the calling dialog box has already been closed, the select mode is returned to the normal mode, and the Event Dialog Box is not closed. Otherwise, this dialog box will be closed.
New	Newly creates an event condition in this dialog box. An event condition name is automatically created and a new event condition is prepared.
Set	Registers the various event conditions. Because the dialog box is not closed even after an event has been registered, new event conditions can be registered. **In the select mode** An event condition is selected. If there is an event being edited, it is automatically registered and selected.

Enable/Disable	Validates (enables) or invalidates (disables) the selected event condition. However, event conditions and event link conditions cannot be enabled or disabled. Same operation as the clicking the mark of event icon.
Clear	Clears the contents of the event condition.
Restore	Restores the contents of an edited event condition. If an event condition not registered is displayed, all the fields other than the event name field are blank or the default values are set.
Cancel Close	Closes this dialog box. Even if an event condition is being edited, it is not registered and the dialog box is closed.
Help	Displays the help window of this window.

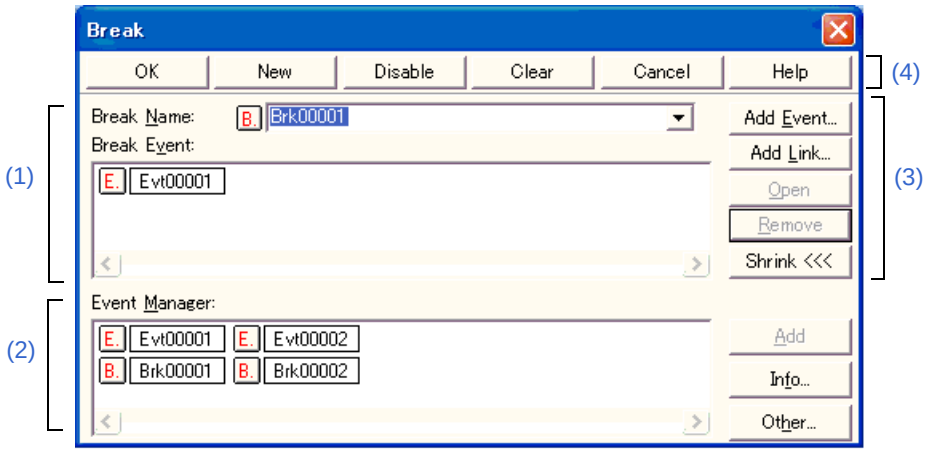
Break Dialog Box

This dialog box is used to register; set, and display break event conditions. (Refer to "5.12 Event Function", "5.4 Break Function".)

Registration and setting of break event conditions is done by setting each item (256 items max.) in this dialog box and then clicking the <OK> button. The registered break event conditions are managed by the Event Manager.

There are restrictions on the number of break event conditions that can be simultaneously set (enabled). (Refer to "5.12.4 Number of enabled events for each event condition".)

Figure 6-61 Break Dialog Box



- Opening
- Explanation of Each Area

Opening

Click the **Brk** button, or select [Event] menu -> [Break...].

Explanation of Each Area

(1) Break event condition setting area

Break Name:	This area is used to set a break event name. Directly input an alphanumeric string of up to eight characters as a name. To display the contents of an already created event condition, select from the drop-down list. The mark on the left of this area indicates the utilization status of events. (Refer to "Table 5-18 Event Icon".) The gray mark indicates that an event condition is being edited and has not been registered yet. By clicking the left mark, an event condition can be validated or invalidated.
Break Event:	This area is used to set an event condition for break. Refer to "Table 6-24 Number of Events Settable in Condition Setting Area" for the number of event conditions and event link conditions that can be set in this area. Event conditions are easily set by dragging the icon of the event to be set from the event manager area and dropping it in this area. For details, refer to "5.12.3 Setting event conditions".

Table 6-24 Number of Events Settable in Condition Setting Area

Connected IE		Total Event Condition (Before Execution/After Execution/ Access)	Event Link Condition
[IECUBE]		16 (2 / 8 / 6)	1
[MINICUBE]	Nx85ET （RCU0+TEU+TRCU）	14 (2 / 8 / 4)	-
	Nx85E901（RCU0），RCU1	2	-
[MINICUBE2]	With debug function	2	-
	Without debug function	-	-

(2) Event manager area

This area displays the list of registered events.

Each event condition can be set easily just by dragging and dropping the event icon displayed in this area onto the event setting area in each event setting dialog box. (Refer to "5.12.3 Setting event conditions".)

This area is common to all event-related dialog boxes.

<Add>	The event condition and event link condition selected in Event Manager area add to setting area with a focus.

<Info...>	Opens the [Event Info] Dialog Box. This dialog box is used to change the display mode and rearrange event names.	
		<Sort by Name>..... Sorts events into name order. <Sort by Kind> ..... Sorts events into type order. <Unsort> ..... Displays events in the order in which they have been registered without sorting the events. <Detail>..... Sets the detailed display mode. <Overview>..... Sets the list display mode. <Cancel> ..... Closes this dialog box (same as ESC key).
<Other...>	Opens the [Set Other] Dialog Box.	
		By clicking each button, the corresponding event setting dialog box can be opened with the new event name set. After the event setting dialog box has been opened, this dialog box is closed. <Manager...> ..... Opens the Event Manager. <Cancel>..... Closes the dialog box to create event condition.

(3) Function buttons (for event condition contents display, etc.)

These buttons are used to display or delete the event conditions displayed in the event condition setting area, and to display or hide the Event manager area. This area is common to all event-related dialog boxes.

Add Event...	Opens the Event Dialog Box in the select mode, and selects or newly creates an event condition to be set. The event condition will be added to the area selected when the < Add Event...> button is pressed.
Add Link...	Opens the Event Link Dialog Boxin the select mode, and selects or newly creates an event link condition. The event condition will be added to the area selected when the < Add Link...> button is pressed.

Open	Opens the various event setting dialog box corresponding to the selected event condition (one). Each setting dialog box displays the contents of the selected event condition. Same operation as double-clicking the event icon or pressing the Enter key.
Remove Delete	Deletes the selected event. When an event condition or an event link condition is to be deleted, an error occurs and the event condition or event link condition cannot be deleted if the event is used as a various event condition.
Expand >>> Shrink <<<	Turns on or off display of the event manager area. The size of the dialog box is expanded or reduced.

(4) Function buttons (for registering, deleting, validating, and invalidating event conditions)

These buttons are used to register, delete, validate, and invalidate the events.

The event with the specified event condition is registered or set (validated) by clicking the <OK> (or <Set>) button. This area is common to all event-related dialog boxes.

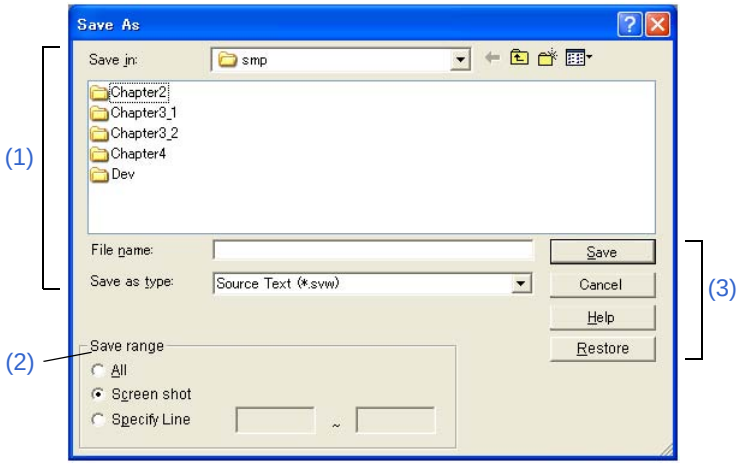
OK	Automatically registers the event condition or the various event condition being edited, if any, and closes this dialog box. Each event condition becomes valid as soon as it has been registered.
New...	Newly creates an event condition in this dialog box. An event condition name is automatically created and a new event condition is prepared.
Set	Registers the event condition or the various event condition. Because the dialog box is not closed even after an event has been registered, new event conditions can be registered. Each event condition becomes valid as soon as it has been registered.

Enable/Disable	Validates (enables) or invalidates (disables) the selected event condition. However, event conditions and event link conditions cannot be enabled or disabled. Same operation as the clicking the mark of event icon.
Clear	Clears the contents of the event condition.
Restore	Restores the contents of an edited event condition. If an event condition not registered is displayed, all the fields other than the event name field are blank or the default values are set.
Cancel Close	Closes this dialog box. Even if an event condition is being edited, it is not registered and the dialog box is closed.
Help	Displays the help window of this window.

View File Save Dialog Box

This dialog box is used to save the current display information of the current window to a view file. (Refer to "5.15.2 Window display information (view file)".)

Figure 6-62 View File Save Dialog Box



- Opening
- Explanation of Each Area

Opening

When the window to be saved is the current window, select [File] menu -> [Save As...].

Explanation of Each Area

(1) Save file setting area

Save in: File name:	This area is used to specify a file name. A file name can be directly input, or selected from the list at the upper part of this area. Up to 257 characters string with a extension can be specified.
Save as type:	This area is used to specify the type (extension) of the file to be saved. (Refer to "Table 5-21 Type of View Files".) The extension of the file corresponding to the current window is displayed.

(2) Save range setting area

If a range of 100 lines / 100 frames / 256 bytes or more is specified, a message dialog box is displayed to indicate the progress of saving. To stop saving midway, click the <Stop> button in the message dialog box.

<table>
<tr><td rowspan="5">Save range</td><td colspan="2">Specify the range of data to be saved.
This area is displayed if the current window to be saved is the following.
- Source Window
- Assemble Window
- Memory Window
- Trace View Window</td></tr>
<tr><td>All</td><td>This should be selected to save the entire range, from the first line to the last line.</td></tr>
<tr><td>Screen shot</td><td>This should be selected to save the area visible on the screen, from the top line on the screen to the bottom line. If the Source Window is in the mixed display mode, however, the window contents are saved from the source line that includes the area visible on the screen.</td></tr>
<tr><td rowspan="3">Specify Line
Specify Frame
Specify Address</td><td>This should be selected to specify the start line and end line of the area to be saved.
If the start line and end line are omitted, the first line and last line are assumed.
Display any of the following corresponding to the current window:</td></tr>
<tr><td>Specify Line
Specify the range of the line numbers to be saved.
The default radix for inputting a numeric value is decimal.
If the Source Window is in the mixed display mode, the mixed displayed part on the specified line is also saved.
Specify Frame [IECUBE]
Specify the range of trace frames to be saved. (Refer to "Table 6-18 Frame Number Specification Format".) The default radix for inputting a numeric value is decimal.</td></tr>
<tr><td>Specify Address
Specify the range of address to be saved.
An address can be also specified by a symbol or expression. (Refer to "Table 5-6 Specifying Symbols".)
The default radix for inputting a numeric value is hexadecimal.</td></tr>
</table>

(3) Function buttons

Save	Saves the display information of the current window to the selected file. After saving, this dialog box is closed.
Cancel	Closes this dialog box without executing anything.
Help	Displays this dialog box online help files.
Restore	Restores the status before this dialog box was opened.

View File Load Dialog Box

This dialog box is used to read the view files. (Refer to "5.15.2 Window display information (view file)".)

When a view file is loaded, the reference window (Source Window in static status) opens and the display information at saving is displayed.

The window to be opened and its status differ as follows, depending on the file to be loaded.

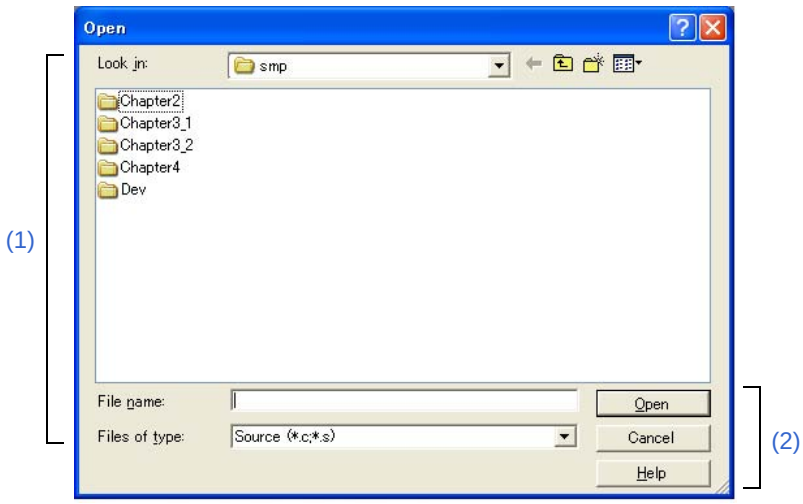
- **Loading source file to which symbol information has been read**

  If there is a Source Window in the active status, it is opened in the static status; otherwise, the Source Window is opened in the active status.

- **Loading source file to which symbol information has not been read, or view file**

  A window of text-format files is opened in the Source Window in the static status.

Figure 6-63 View File Load Dialog Box



- Opening
- Explanation of Each Area

Opening

Click the **Open** button or select [File] menu -> [Open...].

Explanation of Each Area

(1) Load file setting area

Look in: File name:	This area is used to specify the file name to be loaded. A file name can be directly input from the keyboard, or selected from the list. Up to 257 character string with a extension can be specified.
Files of type:	This area is used to specify the type (extension) of the file to be loaded. (Refer to "Table 5-21 Type of View Files".)

(2) Function buttons

Open	Loads the selected file. After loading the file, this dialog box is closed.
Cancel	Closes this dialog box without executing anything.
Help	Displays this dialog box online help files.

Environment Setting File Save Dialog Box

This dialog box is used to save the setting contents of the current window to a setting file. (Refer to "5.15.3 Window setting information (setting file)".)

Figure 6-64 Environment Setting File Save Dialog Box

- Opening
- Explanation of Each Area

Opening

When the window to be saved is the current window, select [File] menu -> [Environment] -> [Save As...].

Explanation of Each Area

(1) Save file setting area

Save in: File name:	This area is used to specify a file name. A file name can be directly input, or selected from the list at the upper part of this area. Up to 257 characters string with a extension can be specified.
Save as type:	This area is used to specify the type (extension) of the file to be saved. (Refer to "Table 5-22 Type of Setting Files".) The extension of the file corresponding to the current window is displayed.

(2) Function buttons

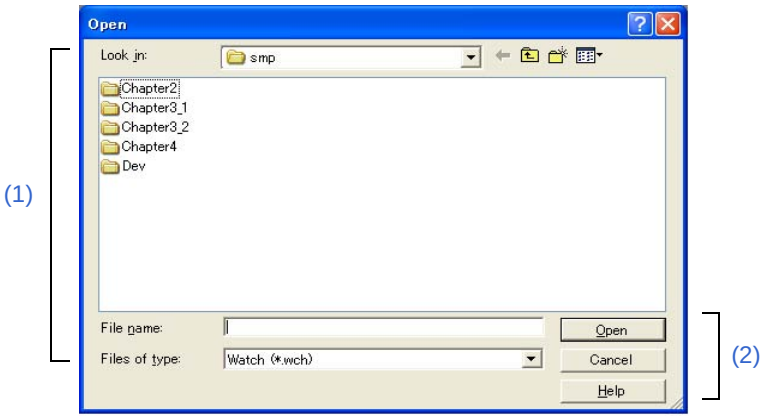
Save	Saves the setting information of the current window to the selected file. After saving, this dialog box is closed.
Cancel	Closes this dialog box without executing anything.
Help	Displays this dialog box online help files.

Environment Setting File Load Dialog Box

This dialog box is used to read the setting files. (Refer to "5.15.3 Window setting information (setting file)".)

When a setting file is loaded, the target window opens and the setting information at saving is restored.

Figure 6-65 Environment Setting File Load Dialog Box



- Opening
- Explanation of Each Area

Opening

select [File] menu -> [Environment] -> [Open...].

Explanation of Each Area

(1) Load file setting area

Look in: File name:	This area is used to specify the file name to be loaded. A file name can be directly input from the keyboard, or selected from the list. Up to 257 character string with a extension can be specified.
Files of type:	This area is used to specify the type (extension) of the file to be loaded. (Refer to "Table 5-22 Type of Setting Files".)

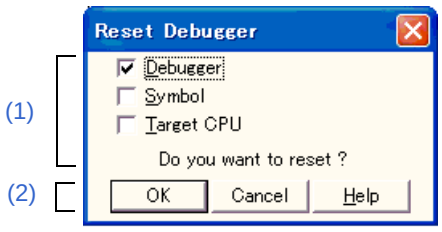
(2) Function buttons

Open	Loads the selected file. After loading the file, this dialog box is closed.
Cancel	Closes this dialog box without executing anything.
Help	Displays this dialog box online help files.

Reset Debugger Dialog Box

This dialog box is used to initialize the ID850QB, CPU, and symbol information.

Figure 6-66 Reset Debugger Dialog Box



- Opening
- Explanation of Each Area

Opening

Select [File] menu -> [Debugger Reset...].

Explanation of Each Area

(1) Reset subject selection area

This area is used to specify what is to be Initialized. Initializes the selected item.

Debugger	Initializes the ID850QB. (default)
Symbol	Initializes the symbol information.
Target CPU	Initializes the CPU.

(2) Function buttons

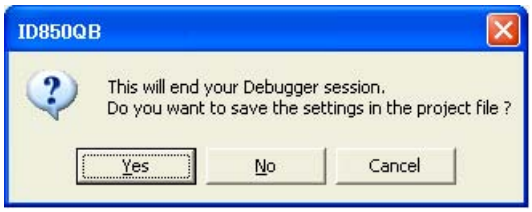
OK	Initializes according to the setting.
Cancel	Cancels the changes and closes this dialog box.
Help	Displays this dialog box online help files.

Exit Debugger Dialog Box

This dialog box is used to select whether the current debug environment is saved to a project file or not before terminating the ID850QB. (Refer to "5.15.1 Debugging environment (project file)".)

It can be specified in the Debugger Option Dialog Box that the ID850QB is terminated without this confirmation dialog box being opened.

Figure 6-67 Exit Debugger Dialog Box



- Opening
- Function buttons

Opening

- Select [File] menu -> [Exit].
- If forcible termination, such as to terminate the application, has been executed on the task list that terminates Windows.

Function buttons

Yes	Saves the current debug environment to a project file, closes all the windows, and terminates the ID850QB. If a project file name is not specified, the Project File Save Dialog Box is opened. If the <Cancel> button is selected on the Project File Save Dialog Box, the environment is neither saved to a project file nor is the ID850QB terminated. (If a project file is loaded or saved during debugger operation, this button has the default focus.)
No	Closes all the windows and terminates the ID850QB. (If a project file is not loaded or saved during debugger operation, this button has the default focus.)
Cancel	Closes this dialog box without executing anything.

About Dialog Box

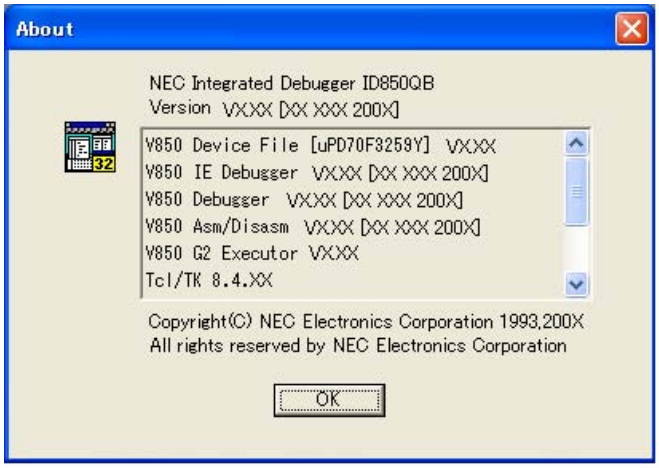
This dialog box displays the version information of the ID850QB (the year is displayed in 4 digits).

Remark: The version information can be copied to the clipboard by selecting [Select All and Copy (&C)] from the context menu in the dialog box.

The following version information is displayed:

- Product version of ID850QB
- Version of device file
- Version of GUI
- Version of debugger DLL
- Version of assembler DLL
- Version of executor
- Version of Tcl/Tk
- Product ID and product version of in-circuit emulator

Figure 6-68 About Dialog Box



- Opening

Opening

Select [Help] menu -> [About...].

Remark: This dialog also be opened by clicking the <About...> button in the Configuration Dialog Box.

Console Window

This window is used to input commands that control the ID850QB.

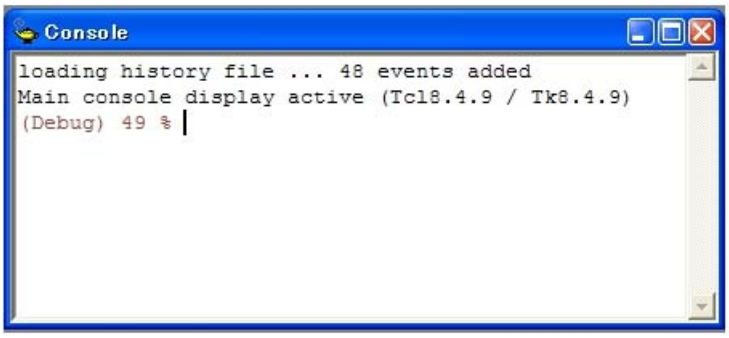
Because the key bind is Emacs-like, the accelerator key is not acknowledged if the Console Window is active. However, the F1 key displays the online help files of the Console Window.

While the Console Window is open, an error message window with only an <OK> button is displayed in the Console Window.

The command history is saved when the Console window is closed.

Refer to "CHAPTER 7 COMMAND REFERENCE" for details on the command specifications.

Figure 6-69 Console Window



- Opening
- Explanation of Each Area

Opening

Select [Browse] menu -> [Console].

Explanation of Each Area

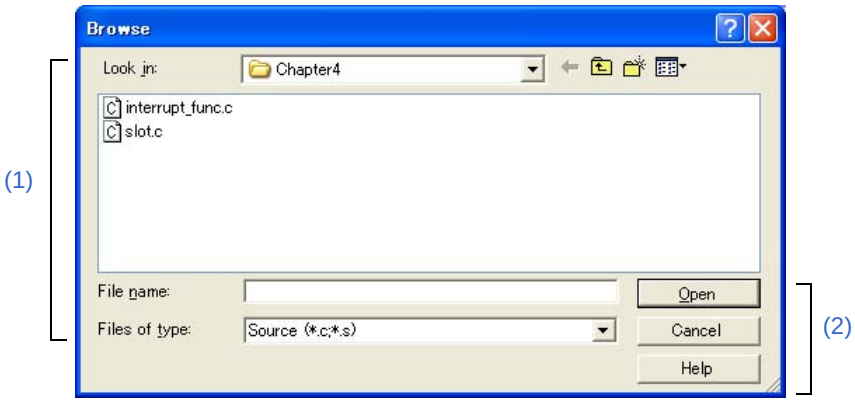
Refer to "CHAPTER 7 COMMAND REFERENCE" for details on the command specifications.

Browse Dialog Box

This dialog box is used to select the file to be set in the Source Text Move Dialog Box.

Remark: If this dialog box is opened for the first time after the system has been started up, the directory first specified by the source path is displayed. When the dialog box is opened the second and subsequent times, the previously displayed directory is recorded and displayed again. If the <Cancel> button is clicked, however, the previously displayed directory is not recorded.

Figure 6-70 Browse Dialog Box



- Opening
- Explanation of Each Area

Opening

Click the <Browse...> button in the target dialog box.

Explanation of Each Area

(1) Open file setting area

Look in:	This area is used to specify the file name to be opened. A file name can be directly input from the keyboard, or selected from the list. Up to 257 character string with a extension can be specified.
File name:	
Files of type:	This area is used to specify the type (extension) of the file to be opened. (Refer to "Table 5-5 File Type Can Be Displayed".)

(2) Function buttons

Open	Sets the selected file. After setting the file, this dialog box is closed.
Cancel	Closes this dialog box without executing anything.
Help	Displays this dialog box online help files.

CHAPTER 7 COMMAND REFERENCE

This chapter explains the details of the command functions of the ID850QB.

7.1 Command Line Rules

The specification of command lines has the following rules:

- Command name, option, and argument are specified for command line.
- To divide words, a space (space key or tab key) is used.
- At the end of a line, a line feed character or a semicolon is used.
- When a command name and an option are entered to the point of identifiability, they are recognized.
- In script, command names have to be entered completely.

Command format

command *-options arg1 arg2 arg3 ...*

7.2 Command List

Table 7-1 Debugger Control Command List

Command Name	Function
address	Evaluation of address expression
assemble	Disassemble/line assemble
batch	Executing batch (with echo)
breakpoint	Setting/deletion of breakpoint
cache	Setting of cache **[MINICUBE]**
dbgexit	Terminating ID850QB
dbgopt	Selecting debugger option
download	Download of files
efconfig	Setting flash memory in external space
erase	Deletion of the internal flash memory
extwin	Creation of expansion window
finish	Returning from function
flop	Manipulation related to internal flash memory
go	Continuous execution
help	Display of help
hook	Setting of hook
ie	Display/setting of IE register
inspect	Symbol inspect
jump	Jump to window
map	Setting / deleting memory mapping
mdi	Setting of expansion window
memory	Display/setting of memory
module	Display of the list of files and functions
next	Procedure step
refresh	Redrawing of window
register	Display/setting of register value and IOR value
reset	Reset
run	Reset and execution of CPU
step	Step execution
stop	Stop execution

Command Name	Function
upload	Upload
version	Display of the version information
watch	Display/setting of variables
where	Stack trace
wish	Start of Tclet
xcoverage	Operation of coverage **[IECUBE]**
xtime	Operation of timer **[IECUBE]**
xtrace	Operation of tracer **[IECUBE]**

Table 7-2 List of Console/Tcl Commands

Command Name	Function
alias	Creation of another name
cd	Change of directory
clear	Clears the screen
echo	Echo
exit	Close/end
history	Display of history
ls	Display of files
pwd	Check of the directory
source	Execution of batch
time	Measurement of time for commands
tkcon	Console control
unalias	Deletion of another name
which	Display of the command path or another name
Other	Based on Tcl/Tk 8.4

Remark For details of the Tcl commands, select the [start] menu -> [All Programs] ->[NEC Electronics Tools] -> [ID850QB] -> [V*X.xx*] -> [ID850QB V*X.xx* Tcl8.4 Help].

7.3 List of Aliases

The commands can be specified with other names by defining their aliases in the file "bin/idtcl/aliases.tcl".

The aliases are described by default as shown below.

This file can be edited with an editor.

Table 7-3 Contents of File aliases.tcl

```
alias a assemble
alias b breakpoint
alias g go
alias i step -i
alias j jump
alias l download
alias m memory
alias n next
alias r run
alias s step
alias w watch
```

7.4 List of Variables

Table 7-4 List of Variables

Variable	Function
dcl (chip)	Chip name read only
dcl (prjfile)	Project file name read only
dcl (srcpath)	Source path read only
dcl (ieid)	IE type read only
dcl (iestat)	IE status read only
dcl (bkstat)	Break status read only
env (LANG)	Language
dcl_version	Dcl version read only

7.5 List of Packages

Table 7-5 List of Packages

Package	Function
tcltest	Restoration test
cwind	Automatic window control
BWidget	Toolkit
tcllib	Tcllibrary
mclistbox	Multi-column list box
combobox	Combo box

7.6 Key Bind

- tcsh + Emacs like
- Complement of command name [Tab]
- Complement of file name [Tab]
- HTML help [F1]

7.7 Expansion Window

The expansion windows can be created using Tk.

In the expansion windows, Widget is allocated with '.dcl' as a root instead of '.'.

When the following script files are allocated in bin/idtcl/tools/, an expansion window is added on selecting [Browse] menu -> [Others].

The mdi command, an exclusive command for expansion windows, has been added.

```
# Sample.tcl
wm protocol .dcl WM_DELETE_WINDOW { exit }
mdi geometry 100 50
button .dcl.b -text Push -command exit
pack .dcl.b
```

Caution: In the expansion windows, Tk menu commands cannot be used because of the restrictions of MDI windows.

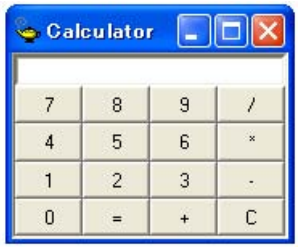
7.7.1 Samples (calculator script)

The script of the expansion window in which the calculator script is described and its execution screen are shown below.

Script of expansion window

```
# Calculator.tcl
mdi geometry 100 100
set top .dcl
entry $top.e -relief sunken -textvariable v
frame $top.f -height 120 -width 120; pack $top.e -fill x; pack $top.f -fill both -expand 1
set i 0; set v {}; set r 0.25
foreach n {7 8 9 / 4 5 6 * 1 2 3 - 0 = + C} {
        if {$n == "=" || $n == "C"} {
                button $top.f.b$n -text $n
        } else {
                button $top.f.b$n -text $n -command "$top.e insert end $n"
        }
        place $top.f.b$n -relx [expr ($i%4)*$r] -rely [expr ($i/4)*$r] -relw $r -relh $r
        incr i
}
bind $top.f.bC <1> {$top.e delete 0 end}
bind $top.f.b= <1> {catch {expr $v} v}
```

Figure 7-1 Execution Screen



7.8 Callback Procedure

Expansion windows can hold dcl_asyncproc procedures called by asynchronous messages.

```
proc dcl_asyncproc {mid} {
    if {$mid == 19} {
        redraw
    }
}
```

The asynchronous message ID is passed for the argument of the dcl_asyncproc procedure

The message IDs are shown below:

Table 7-6 Message ID

Message ID	Meaning
9	After changing configuratio
10	After registering event
11	After deleting event
12	Before executing
13	After breaking
14	After resetting CPU
15	After resetting ID850QB
17	After changing extended option
18	After changing debugger option
19	After downloading
20	After changing memory or register
36	Before starting tracer **[IECUBE]**
37	After stopping tracer **[IECUBE]**
40	Before starting timer **[IECUBE]**
41	After stopping timer **[IECUBE]**
42	After clearing trace **[IECUBE]**
45	After resetting symbol
46	After change from RRM function to trace function, and change from trace function to RRM function. **[IECUBE]**

7.9 Hook Procedure

A hook can be set in the ID850QB using the hook procedure.

The hook procedures are shown below:

- BeforeDownload(Hook before downloading)
- AfterDownload(Hook after downloading)
- AfterCpuReset(Hook after CPU reset during break)
- BeforeCpuRun(Hook before starting execution)
- AfterCpuStop(Hook after breaking)

By using hook procedures, register values can be changed before downloading programs or after resetting the CPU.

An actual example of the procedure is shown below. A hook is valid till the ID850QB is closed.

(1) [When hook is set with ID850QB control command]

1) Create script file a. with an editor.
2) Start up the ID850QB, select [Browse] menu -> [Console], and open the Console Window.
3) If the script file is executed in the window as below, the hook in the script file is set.

   %hook test.tcl

(2) [When hook is set on downloading of project file]

1) Create script file a. with an editor.**Note**
2) Start up the ID850QBand read test.prj. The hook in the script file is set.

```
proc BeforeDownload {} {
    register MM 0x7
    register PMC8 0xff
    register PMC9 0xff
    register PMCX 0xe0
}

proc AfterCpuReset {} {
    register MM 0x7
    register PMC8 0xff
    register PMC9 0xff
    register PMCX 0xe0
}
```

Note: Be sure that the script file name is the same as the project file.

Example:

The script file corresponding to test.prj is test.tcl.

Allocate test.prj, test.pri, and test.tcl in the same directory.

7.10 Related Files

Table 7-7 List of Related Files

File Name	Function
aliases.tcl	Executes when the aliases.tcl console is opened. Sets the default alias etc.
Projectfilename.tcl	Executes when the project file name.tcl project is opened. The following hooks can be used. BeforeDownload AfterDownload AfterCpuReset BeforeCpuRun AfterCpuStop
*Loadmodulefilename.*tcl	Executes when the load module name.tcl load module file is downloaded. The following hooks can be used. BeforeDownload AfterDownload AfterCpuReset BeforeCpuRun AfterCpuStop

7.11 Cautions

- The separator for file and path is a slash (/).
- When a console is open, error messages are output to the console.
- To terminate the command forcibly, close the console.
- The execution of external commands (DOS commands) is OFF by default.

7.12 Explanation of Commands

In this section, each command is explained using the format shown below.

Command name

Describes the command name.

Input format

Describes the input format of the command.

In the following explanation, italics indicate an Argument to be supplied by the user, while the argument enclosed in "?" may be omitted.

When a command name and an option are entered to the point of identifiability, they are recognized.

Aliases

Describes the defined command name if the command is defined with another name. For details, refer to "7.3 List of Aliases".

Functions

Explains the functions of the command.

Usage example

Shows an example of the usage of the command.

address

address - Evaluation of address expression

Input format

address *expression*

Functions

Converts the address expression specified by *expression* into address.

Usage example

```
(IDCON) 1 % address main
0xaa
(IDCON) 2 % address main+1
0xab
```

assemble

assemble - Disassemble/line assemble

Input format

assemble *?options? address ?code?*

Functions

Line assembles the character strings specified by *code*from the *address* specified by address.

When '.' is specified for address, it is understood as an *address* continuing from the immediately disassemble.

When *code* is omitted, it is disassembled from the *address* specified by address.

The following are *options*: They are ignored for line assembly.

-code	Command code is also displayed.It is ignored for line assembly.
-number *number*	*Number* line is displayed. It is ignored for line assembly.

Usage example

```
(IDCON) 1 % assemble -n 5 main
0x000000aa  B7          PUSH  HL
0x000000ab  B1          PUSH  AX
0x000000ac  891C        MOVW  AX,SP
0x000000ae  D6          MOVW  HL,AX
0x000000af  A100        MOV   A,#0H
(IDCON) 2 % assemble main mov a,b
(IDCON) 3 % assemble . mov a,b
```

batch

batch - Executing batch (with echo)

Input format

batch *scriptname*

Functions

Executes in batch with displaying files specified by *scriptname* on the screen.

Nesting is possible.

Usage example

```
(IDCON) 1 % clear
(IDCON) 2 % batch bat_file.tcl
(IDCON) 3 % tkcon save a:/log.txt
```

breakpoint

breakpoint - Setting/deletion of breakpoint

Input format

breakpoint *?options? ?address1? ?address2?*

breakpoint -delete *brkno*

breakpoint -enable *brkno*

breakpoint -disable *brkno*

breakpoint -information

Aliases

b

Functions

Operates the breakpoint specified by *options* and *address*.

If a breakpoint can be set correctly, the breakpoint number is returned.

The following are *options*:

-software	A software break is specified.
-hardware	A hardware break is specified. (default)
-execute	The *address* execution break is set. (default)
-beforeexecute	The break before *address* execution is set.
-read	An *address* data read break is set.
-write	An *address* data write break is set.
-access	An *address* data access break is set.
-size *size*	The access size is set (8, 16 or 32) .(Unit: bit) **[IECUBE]**
-data *value*	The data condition is set.
-datamask *value*	The data mask is set.
-information	The list of breakpoints is displayed.
-delete	The breakpoint whose number is specified is deleted.
-disable	The breakpoint whose number is specified is disabled.
-enable	The breakpoint whose number is specified is enabled.

Usage example

```
(IDCON) 1 % breakpoint main
1
(IDCON) 2 % breakpoint -i
1 Brk00001 enable rammon.c#17

(IDCON) 3 % breakpoint -software sub
2
(IDCON) 4 % breakpoint -i
1 Brk00001 enable rammon.c#17
2 Brk00001 enable rammon.c#8

(IDCON) 5 % breakpoint -disable 2
(IDCON) 6 % breakpoint -i
1 Brk00001 enable rammon.c#17
2 Brk00001 disable rammon.c#8

(IDCON) 7 % breakpoint -delete 1
2 Brk00001 disable rammon.c#8
```

cache

[MINICUBE]

cache - Setting of cache

Input format

cache

cache *config ?-icache itype? ?-dcache dtype?*

cache *clear ?-icache bool? ?-dcache bool?*

Functions

When *config* is specified for the subcommand, the cache type is set.

When *clear* is specified for the subcommand, whether cache clear is to be done by EXEC, or not, is set (default is clear)

When subcommand or below is omitted, the current status is displayed.

itype is selected from the following:

NB85E212	NB85E212 is used.
NB85E213	NB85E213 is used.
nouse	Not used (default).

dtype is selected from the following:

NB85E252	NB85E252 is used.
NB85E263	NB85E263 is used.
nouse	Not used (default).

bool is selected from the following:

0, false, or off	Off
1, true, or on	On

Usage example

```
(IDCON) 1 % cache config -i NB85E212 -d NB85E252
(IDCON) 2 % cache
i-cache: NB85E212
d-cache: NB85E252
(IDCON) 3 % cache clear -i false
(IDCON) 4 % cache
i-cache: NB85E212 (persist)
d-cache: nouse
```

dbgexit

dbgexit - Terminating ID850QB

Input format

dbgexit *?options?*

Functions

Terminate the ID850QB.

The following are *options*:

-saveprj	Project is saved on terminating ID850QB.

Usage example

(IDCON) 1 % dbgexit -saveprj

dbgopt

dbgopt - Selecting the debugger option

Input format

dbgopt *options ?value?*

Functions

Selects the option of the debugger. The following are *options*:

-function *?func?* **[IECUBE]**	Switches the RRM function, trace function, or coverage function When *func* is omitted, the current function is displayed. *func* is selected from the following:	
	rrm	RRM function is selected.
	trace	Trace function is selected.
	coverage	Coverage function is selected.

Usage example

(IDCON) 1 % dbgopt -function trace

download

download - Download of files

Input format

download *?options? filename ?offset?*

Aliases

l

Functions

Downloads files specified with *filename* according to *options*. (The load module format files and HEX-format files are automatically recognized.)

If *offset* is specified, the address is shifted by the *offset* (if the data is in binary format, the load start address is specified for *offset*).

-binary	Binary format data is downloaded.
-coverage	Coverage data is downloaded. **[IECUBE]**
-append	Additional download is executed.
-nosymbol	Download is executed. Symbol information is not read.
-symbolonly	Symbol information is read.
-erase	The contents of the internal flash memory are erased all before download. (Only a product with internal flash memory.) **[MINICUBE]**
-reset	CPU is reset after download.
-information	Download information is displayed.
-extflash	Data in the flash memory in an external space is given priority for downloading. (When using an E2 core, addresses in internal instruction RAM area and the flash memory area in an external space may overlap, so use this option to give priority to one of them.) Data in internal instruction RAM takes precedence for downloading when this option is omitted (default).
-idtag	HEX file with an ID tag is downloaded.
-highspeed	The clock is switched to the highest one for downloading. **[IECUBE]** CPU reset occurs when the clock is switched.

Usage example

(IDCON) 1 % download test.lmf

efconfig

efconfig - Setting of flash memory in external space

Input format

efconfig *?options? ?filename address size parallel serial?*

Functions

This command sets the flash memory in the external space.

Be sure to set the flash memory before downloading data to it.

The following are *options*:

filename	Specifies information file of the flash memory by a full path.
address	Specifies the start address of the flash memory.
size	Specifies the data width (access size) of the flash memory (8, 16, or 32**Note**).
parallel	Specifies the number of flash memories in parallel (1 or more**Note**).
serial	Specifies the number of flash memories in series.(1 or more**Note**).

Note: For the set value, refer to refer to "Table 7-8 Parameter Set Values (example)" .

If all the parameters are omitted, the current setting and the total size (KB) of the flash memory are displayed.

The following *options* are also available.

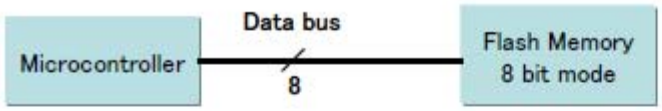
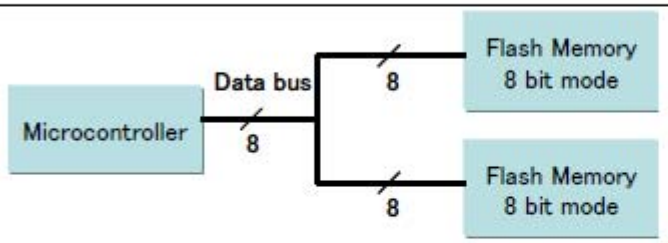
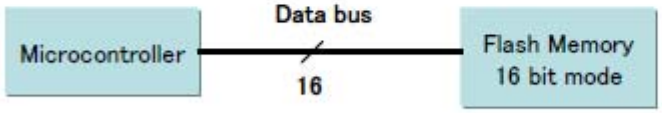
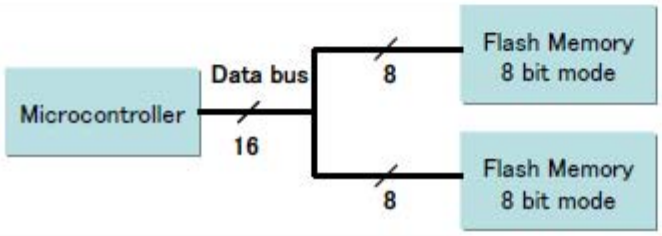
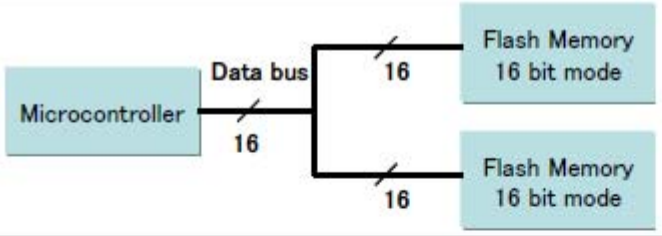
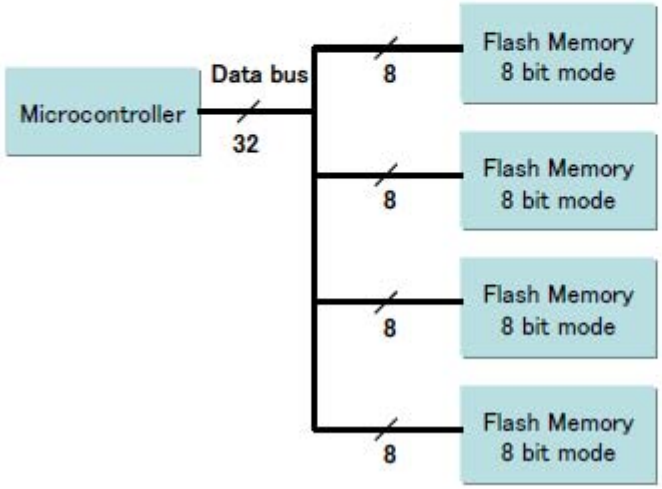
-id	Displays the ID information (manufacturer code and device code) of the flash memory in the external space). This information will not be correctly displayed if the setting is not correctly made.
-clear	Deletes the set information.

Usage example

(IDCON) 1 % efconfig c:/MBM29LV800BA.fdb 0x100000 16 2 1
(IDCON) 2 % efconfig

(IDCON) 3 % efconfig -id

Table 7-8 Parameter Set Values (example)

Connection of flash memory	size	parallel	serial
	8	1	1
	8	1	2
	16	1	1
	16	2	1
	16	1	2
	32	4	1

erase

erase - Erasure of the flash memory

Input format

erase

Functions

Erases the internal flash memory.

The following are *options*:

Erases the code flash memory if none of the following options is specified.

-code	Erases the code flash memory.
-data	Erases the data flash memory.
-external	Erases the flash memory in an external space.

Usage example

(IDCON) 1 % erase -code -data

extwin

extwin - Creation of expansion window

Input format

extwin *scriptfile*

Functions

Creates expansion window with *scriptfile*.

Usage example

(IDCON) 1 % extwin d:/foo.tcl

finish

finish - Returning from function

Input format

finish

Functions

Executes until it returns to the program that called the current function.

Usage example

(IDCON) 1 % finish

flop

[MINICUBE]

flop -Manipulation related to user flash memory

Input format

flop -init

flop -user *clock*

Functions

Selects whether the clock-related settings during user flash memory write are the device file settings or user settings.

-init	Processing is performed using the device file setting. If the device file contains no information, an error occurs during internal flash memory write. In this case, use the -user option.
-user *clock*	IOR of the clock generation function is manipulated. Specify for *clock* the frequency (MHz) of the CPU clock (fCPU) determined by the IOR manipulation. In this case, perform the IOR setting using the hook procedure.

Usage example

(IDCON) 1 % flop -user 13.5

go

go - Continuous execution

Input format

go *?options?*

Aliases

g

Functions

Executes program continuously.If -waitbreak is specified, the command waits until the program stops.

The following are *options*:

-ignorebreak	Breakpoint is ignored.
-waitbreak	The command waits for the program to stop.

Usage example

(IDCON) 1 % go -w

help

help - Display of help

Input format

help

Functions

Displays Dcl help.

Usage example

```
(IDCON) 1 % help
For more information on a specific command, type HELP command-name
ASSOC    Displays or modifies file extension associations.
AT       Schedules commands and programs to run on a computer.
ATTRIB   Displays or changes file attributes.
BREAK    Sets or clears extended CTRL+C checking.
CACLS    Displays or modifies access control lists (ACLs) of files.
CALL     Calls one batch program from another.
CD       Displays the name of or changes the current directory.
CHCP     Displays or sets the active code page number.
CHDIR    Displays the name of or changes the current directory.
CHKDSK   Checks a disk and displays a status report.
CHKNTFS  Displays or modifies the checking of disk at boot time.
CLS      Clears the screen.
 :
 :
 :
```

hook

hook - Setting of hook

Input format

hook *scriptfile*

Functions

Sets the procedure for hook with *scriptfile*.

The hook setting is initialized when the project file is loaded and when the ID850QB is reset.

Usage example

(IDCON) 1 % hook d:/foo.tcl

ie

Display/setting of IE register

Input format

ie reg *address ?value?*

ie dcu *address ?value?*

Functions

The ie command depends on the IE.

When reg is specified for the subcommand, referencing and setting of the IE register is executed.

When dcu is specified for the subcommand, referencing and setting of the DCU register is executed.

When using a Midas Lab emulator, input an rte4win32 internal command following ie.

For details on commands, refer to the rte4w32 user's manual.

Example:

ie rom1 100000 20000 1m rom16 bus16 !wren

Caution: The value of a register will be reset by 0 if a DCU register is referred to.

Usage example

(IDCON) 1 % ie reg 0x100 1
(IDCON) 2 % ie dcu 0x100 1

inspect

inspect - Symbol inspect

Input format

inspect *?options? progname pattern*

Functions

Searches and displays the load module symbol specified with *progname* using the regular expression of *pattern*.

The following regular expressions can be used.

?	Match 1 character
*	Match characters other than 0
[chars]	Match chars character. (Range specification such as [a-z/0-9] also possible.)
\x	Match character x. (? * [ ] \ specification also possible.)

The following are *options*:

-nocase	The case is distinguished.
-address	Displays in pair with symbol address.

Usage example

(IDCON) 1 % inspect test1.out {[a-z]*}

jump

jump - Jump to window

Input format

jump -source -line *filename ?line?*

jump *?options? address*

Aliases

j

Functions

Displays the window specified by *options*.

-source	The Source Window is displayed from the address specified by *address*.
-assemble	The Assemble Window is displayed from the address specified by *address*.
-memory	The Memory Window is displayed from the address specified by *address*.
-line	The command is moved to the line specified by *line*.
-focus	The Focus is moved to the window displayed.

Usage example

(IDCON) 1 % jump -s main
(IDCON) 2 % jump -s -l mainfile.c 10
(IDCON) 3 % jump -m array

map

map - Setting/deletion of memory mapping

Input format

map *options address1 address2 ?accsize? ?cs?*

Functions

Sets, deletes, and displays memory mapping.

Remark: The access size of 8, 16, or 32 is specified by *accsize* (unit: byte, the default is 8).

Caution: To map an emulation memory (alternate ROM/RAM) with the ID850QB, specify either cs0, cs1, cs2, cs3, cs4, cs5, cs6, or cs7 for *cs* for chip selection.
In the case of the V850ES microcontrollers, this specification can be omitted because the allocation by chip selection may be fixed or the chip selection function may not be provided. If *cs* is specified, specification of *accsize* cannot be omitted.

The following are *options*:

-erom [IECUBE]	Alternate ROM is mapped. (With memory board)
-eram [IECUBE]	Alternate RAM is mapped. (With memory board)
-target	Target area is mapped.
-targetrom [IECUBE]	Target ROM area is mapped.
-protect	I/O protect area is mapped.
-rrm	Start address of RRM area is set. If performed during user program execution, CPU is stopped for an instant. RRM area can be divided into 8 partitions. The start address and size are specified in pairs in list format as follows. {{address size} {address size} {address size} ...} size is one of 256, 512, 768, 1024, 1280, 1536, 1792, 2048 bytes, and the total size is up to 2048.
-clear	All the settings for the mapping are deleted.
-information	Refer to the setting for the mapping.

Usage example

```
(IDCON) 1 % map -i
1: 0 0x7fff 8 {IROM}
2: 0x8000 0x87ff 8 {Target RRM}
3: 0x8800 0x9fff 8 {Target}
4: 0xa000 0xf7ff 8 {NonMap}
5: 0xf800 0xfaff - {NonMap}
6: 0xfb00 0xfedf 8 {IRAM}
7: 0xfee0 0xfeff 8 {Register}
8: 0xff00 0xffff 8 {IOR}
(IDCON) 2 % map -erom 0x100000 0x10ffff
(IDCON) 3 % map -c
```

mdi

mdi - Setting of expansion window

Input format

mdi geometry *?x y? width height*

mdi title *string*

Functions

Sets the size and title name of the expansion window.

The command can be used only from the expansion window.

Usage example

(IDCON) 1 % mdi geometry 0 0 100 100
(IDCON) 2 % mdi title foo

memory

memory - Display/setting of memory

Input format

memory *?options? address ?value?*

memory *?options?* -fill *address1 address2 value*

memory *?options?* -copy *address1 address2 address3*

Aliases

m

Functions

Sets *value* in the memory of the *address* specified by address according to *options*.

If *value* is omitted, display the value of the memory of the address specified by *address*.

If -fill is specified, data from *address1* to *address2* is filled with *value*.

If -copy is specified, data from *address1* to *address2* is copied to *address3*.

The following are *options*:

-byte	Displayed/set in one-byte units. (default)
-halfword	Displayed/set in halfword units.
-word	Displayed/set in word units.
-fill	The data is filled in.
-copy	The data is copied.
-noverify	Verification is not executed on writing.

Remark: If either of the following operations is performed during user program execution, the CPU is stopped momentarily and execution continues.

- Referencing a memory area other than the RRM area
- Setting of a memory

Usage example

```
(IDCON) 1 % memory 100
0x10
(IDCON) 2 % memory 100 2
(IDCON) 3 % memory 100
0x02
(IDCON) 4 % memory -fill 0 1ff 0
```

module

module - Display of the list of files and functions

Input format

module *progname ?filename?*

Functions

Displays the list of files and functions of the load module specified by *progname*.

If *filename* is not specified, the list of files is displayed.

If *filename* is specified, the list of functions of the specified files is displayed.

Usage example

```
(IDCON) 1 % module rammon.lmf
1: rammon.c
(IDCON) 2 % module rammon.lmf rammon.c
1: rammon.c sub1
2: rammon.c main
```

next

next - Procedure step

Input format

next *?options?*

Aliases

n

Functions

Executes the procedure steps. If functions are called, the step stops after executing function.

The following are *options*:

-source	The command is executed in source line units. (default)
-instruction	The command is executed in command units.

Usage example

(IDCON) 1 % next -i
(IDCON) 2 % next -s

refresh

refresh - Redrawing of window

Input format

refresh

Functions

Redraws the window and updates the data.

Usage example

(IDCON) 1 % batch foo.tcl
(IDCON) 2 % refresh

register

register - Display/setting of register value and IOR value

Input format

register *?options? regname ?value?*

Functions

Sets *value* in the register specified with *regname*.

If *value* is omitted, displays the value of the register specified by *regname*.

The following are *options*:

-force	Compulsory reading or writing is executed.

Remark: If either of the following operations is performed during user program execution, the CPU is stopped momentarily and execution continues.

- Referencing a register
- Setting of a register

Usage example

```
(IDCON) 1 % register pc
0x100
(IDCON) 2 % register pc 200
(IDCON) 3 % register pc
0x200
```

reset

reset - Reset

Input format

reset *?options?*

Functions

Resets the ID850QB , CPU, symbols or events.

If options are omitted, the CPU is reset.

The following are *options*:

-cpu	CPU is reset. (default)
-debugger	The ID850QB is reset.
-symbol	Symbol is reset.
-event	All events and software breaks are reset.

Usage example

(IDCON) 1 % reset

run

run - Reset and execution of CPU

Input format

run *?options?*

Aliases

r

Functions

Resets the program and executes it.

If -waitbreak is not specified, the command does not wait until the program stops.

The following are *options*:

-**waitbreak**	The command waits for the program to stop.

Usage example

(IDCON) 1 % run
(IDCON) 2 % run -w

step

step - Step execution

Input format

step *?options?*

Aliases

s (step -source)

i (step -instruction)

Functions

Executes step execution.

If functions are called, the command stops at the head of the functions.

The following are *options*.

-source	The command is executed in source line units. (default)
-instruction	The command is executed in instruction units.

Usage example

(IDCON) 1 % step -i
(IDCON) 2 % step -s

stop

stop - Stop executing

Input format

stop

Functions

Stops the program forcibly.

Usage example

(IDCON) 1 % run
(IDCON) 2 % stop

tkcon

tkcon - Console control

Input format

tkcon cmd ?arg?

Functions

Controls the Console window.

This command is one of the console/Tcl commands.(Refer to "Table 7-2 List of Console/Tcl Commands".)

tkcon buffer ?size?	Sets and references the maximum buffer size (number of lines) of the console. If the specified buffer size is exceeded, the excessive lines are deleted from the oldest order.
tkcon close **tkcon destroy**	Close the Console window.
tkcon font ?fontname?	Sets and references the fonts used in the Console window.
tkcon gets	Performs standard inputs such as Stdin. Opens a dialog box.
tkcon history ?-newline?	Displays the command history.
tkcon save ?filename? ?type?	Saves the buffer data for the Console window as a file. When the file name or the file type is omitted, a dialog box is opened. Select the type from all, history, stdin, stdout, and stderr.
tkcon version	Displays the console version.

Usage example

(IDCON) 1 % tkcon save c:/temp/logfile.txt all

upload

upload - Upload

Input format

upload *?options? filename address1 address2*

upload -coverage *filename*

Functions

Saves the memory data or coverage data within the specified range in a file.

The following are *options*:

-binary	The data is saved in binary format.
-coverage [IECUBE]	The coverage data is saved. When saving coverage data, all the specified range of the coverage data is saved in the file (specification of start/end addresses not required).
-intel	The data is saved in Intel HEX format. (default).
-motorola	The data is saved in Motorola HEX format.
-tektronix	The data is saved in Tektronix HEX format.
-force	The file is overwritten.

Usage example

(IDCON) 1 % upload -b foo.hex 0 0xffff

version

version - Display of the version information

Input format

version

Functions

Displays the version of the ID850QB.

Usage example

```
(IDCON) 1 % version
GUI          : Vx.xx [XX XXXX 200X]
Devicefile   : V850 Device File [uPD703201] Vx.xx
Debugger     : V850 Debugger Vx.xx [XX XXXX 200X]
Executer     : V850 Executer Vx.xx [XXX XXXX 200X]
Monitor      : V850 Peripheral Vx.xx [XX XXXX 200X]
Assembler    : V850 Asm/Disasm Vx.xx [XX XXXX 200X]
Tcl/Tk       : 8.4.XX
```

watch

watch - Display/setting of variables

Input format

watch *?options? variable ?value?*

Aliases

w

Functions

Displays and sets the variables.

The following are *options*:

-binary	The value is displayed in binary digits.
-octal	The value is displayed in octal digits.
-decimal	The value is displayed in decimal digits.
-hexdecimal	The value is displayed in hexdecimal digits.
-string	The value is displayed in character strings.
-sizeof	The size, instead of the value, of variables is displayed in decimal digits.
-encoding *name*	Encoding during character string display is specified. By default, system encoding is used. *name* (encoding name) is based on the Tcl specification (shiftjis, euc-jp, etc.).

Usage example

```
(IDCON) 1 % watch var
0x10
(IDCON) 2 % watch -d var
16
(IDCON) 3 % watch array\[0\] 0xa
```

where

where - Stack trace

Input format

where

Functions

Executes the back-trace of the stack.

Usage example

```
(IDCON) 1 % where
1: test2.c#sub2(int i)#13
2: test.c#num(int i)#71
3: test.c#main()#82
```

wish

wish - Startup of Tclet

Input format

wish *scriptname*

Functions

Starts up the script using Tk (Tclet).

The expansion window can be created with Tclet.

Usage example

(IDCON) 1 % wish test.tcl

xcoverage

[IECUBE]

xcoverage - Operation of coverage

Input format

xcoverage *option*

Functions

Operates coverage.

The following are *options*:

-clear	Clears the coverage memory.

Usage example

(IDCON) 1 % xcoverage -clear

xtime

[IECUBE]

xtime - Operation of timer

Input format

xtime *option*

Functions

Operates timer.

The following are *options:*

-start	Timer starts on executing the program.
-stop	Timer stops on executing the program.
-gobreak	Time from Go to Break is displayed in nsec.

Usage example

(IDCON) 1 % xtime -start
(IDCON) 2 % xtime -stop

xtrace

[IECUBE]

xtrace - Operation of tracer

Input format

xtrace -dump *?-append? frameno ?filename?*

xtrace -start

xtrace -stop

xtrace -clear

xtrace *-addup ?bool*?

xtrace -mode *?mode?*

xtrace *-complement ?bool*?

Functions

Operates tracer.

The following are *options:*

-start	The tracer starts on executing the program.
-stop	The tracer stops on executing the program.
-clear	Clears the trace memory.
-dump	The trace data is dumped. (default) The dump result is redirected to the console window. If the file name is specified, the dump result is written in the file.
-append	The dump result is added to a file.
-addup *?bool?*	Whether the time tag is totaled or not is selected. When *bool* is omitted, the current mode is displayed.
-mode *?mode?*	The trace control mode (any one of: all, cond, nonstop, fullstop, fullbreak, delaystop, delaybreak, machine, or event) is selected. When *mode* is omitted, the current mode is displayed.
-complement *?bool?*	Selects whether to perform trace complementation. When bool is omitted, the current mode is displayed.

Usage example

```
(IDCON) 1 % xtrace -start
(IDCON) 2 % xtrace -stop
(IDCON) 3 % xtrace -dump 3
_ 01685 2 000000BC M1 br _sub2+0x2
_ 01686 4 0000009A BRM1 st.w r6, 0x8[sp]
_ 01687 3 0000009E BRM1 st.w r0, 0x0[sp]
(IDCON) 4 % xtrace -clear
(IDCON) 5 % xtrace -addup true
```

APPENDIX A EXPANSION WINDOW

- Overview
- Sample Window
- Activation
- Explanation of Each Sample Window

A.1 Overview

With the ID850QB, the user can create custom windows in addition to the existing windows.

The Tcl (Tool Command Language) interpreter and the commands for controlling the debugger are implemented in the ID850QB. Users can create windows using this Tcl.

The ID850QB is supplied with samples of the following expansion windows.

A.2 Sample Window

Table A-1 List of Expansion Window (Sample)

Window Name	Function
List window	Displays a list of the source files and functions.
Grep window	Searches a character string.
RRM window	This is the memory window for real-time RAM monitoring.
Hook window	Sets the hook procedure.
Memory Mapped I/O window	Writes to or reads from the specified address.
Sym Inspect window	Searches through a list of properly described symbols.
Run Break Time window	Displays two types of time: Time at which the user program starts running (Run) and time at which the user program breaks (Break).
OpenBreak window	This window is used to set the open break function.

A.3 Activation

The expansion window can be activated by selecting List, Grep, RRM, Hook, Memory, SymInspect or RunBreak-Time in [Others] on the [Browse] menu.

Remark: Each .tcl file is installed in NEC Electronics Tools\ID850QB*Vx.xx*\bin\idtcl\tools

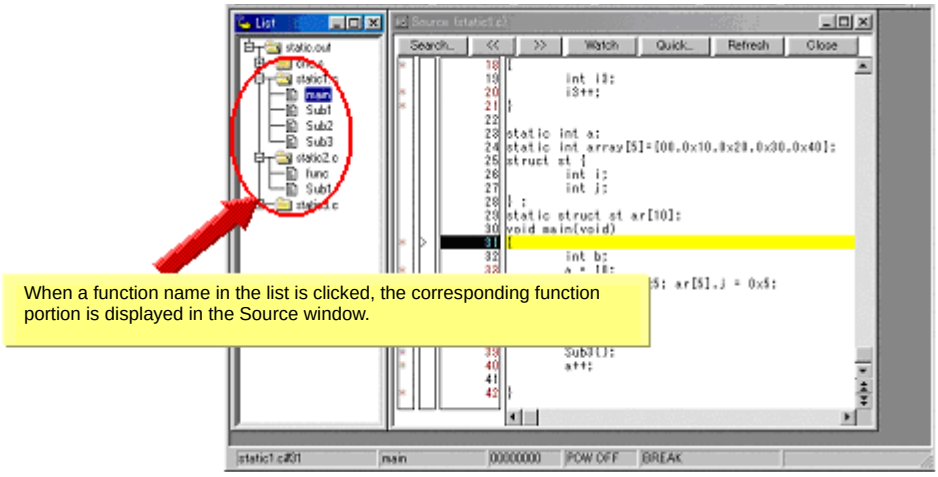
A.4 Explanation of Each Sample Window

The ID850QB provides the sample window below.

List window

The lists of the source files and functions are displayed in a tree format in this window. When a function name in the list is clicked, the corresponding source is displayed.

Figure A-1 List Window

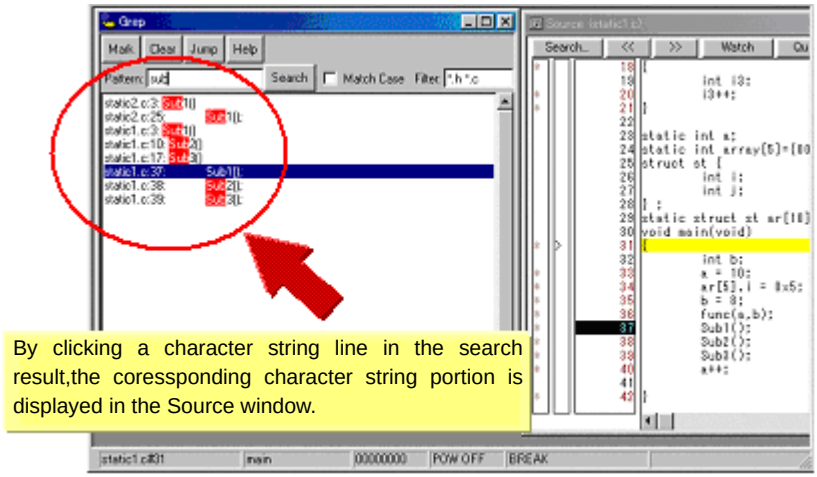


Grep window

Search for a character string is performed in the files under the source path.

When the search result is clicked, the corresponding source is displayed.

Figure A-2 Grep Window



Object	Function
Pattern	Input the character string to be searched.
<Mark> button	Marks the searched character string.
<Clear> button	Clears the marking.
<Jump> button	Put the cursor on a section in the search result and click this button to open the corresponding file.
Match Case	Select whether or not to distinguish uppercase and lowercase.
Filter	Specify the type of the file to be searched.

RRM window

This is a dedicated window for RAM monitoring.

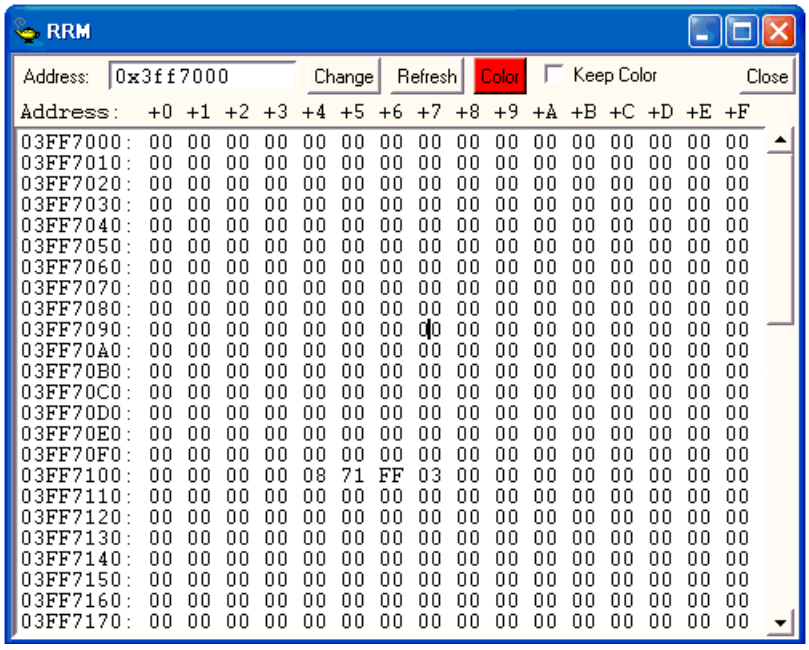
The address area in which a value was changed in the RAM area during program execution is highlighted with a color. The display range is 1 KB. With reading RAM, execution of the user program momentarily breaks. On this window, the start address of the RAM area can be changed while the user program is being executed.

Caution: All data are not read at the same time (because data of 1 KB is divided and read in word units).

Remark1: This RRM window is opened even when the RAM monitor function is set to OFF in the Extended Option Dialog Box.

Remark2: The sampling interval is about 0.3 - 0.7 seconds (20MHz), but it depend on the frequency of the CPU operation. **[MINICUBE]**

Figure A-3 RRM Window



Object	Function
Address	Input the start address to be displayed (automatically aligned to 1 KB.)
<Change> button	Switch the start address display.
<Refresh> button	Reads data from the memory.
<Color> button	The color can be customized. The default color is red.
Keep Color	Specify whether or not to hold the color highlighting. Selected: Once a value is changed, the color highlighting is held until a break occurs. Unselected: The color is cleared if there is no change of values. (default)
<Close> button	Closes this window.

Hook window

This window is used to set a hook to the debugger, using a hook procedure.

The hook procedure enables changing the register value before downloading a program, or after a CPU reset.

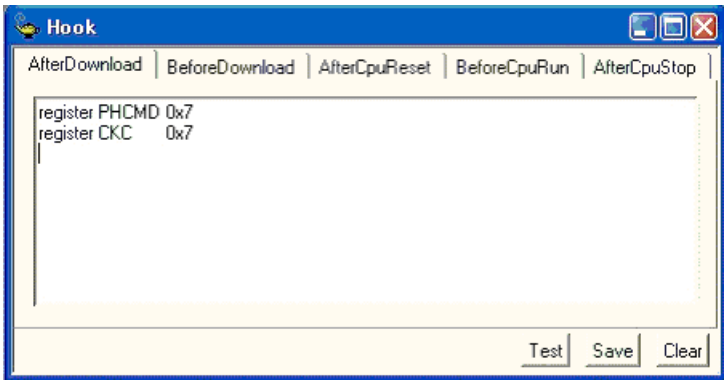
On this window, a hook can be set by using the following five tabs.

- [AfterDownload] tab: Hook after downloading
- [BeforeDownload] tab: Hook before downloading
- [AfterCpuReset] tab: Hook after CPU reset during break
- [BeforeCpuRun] tab: Hook before start of execution
- [AfterCpuStop] tab: Hook after break

Remark: By setting a IOR by using the [BeforeDownload] tab before downloading the load module, for example, downloading can be executed at high speeds. Access to the external memory is also facilitated by using this tab.

If the setting is saved as "project-file-name.tcl" in the directory where the project is stored, the setting is executed when the project is next opened.

Figure A-4 Hook Window



Object	Function
[AfterDownload] tab	Hook after downloading After downloading is performed, the register values input to the tab are automatically overwritten by the specified value.
[BeforeDownload] tab	Hook before downloading Before downloading is performed, the register values input to the tab are automatically overwritten by the specified value.
[AfterCpuReset] tab	Hook after CPU reset during break after resetting CPU, the register values input to the tab are automatically overwritten by the specified value.
[BeforeCpuRun] tab	Hook before starting execution before starting execution, the register values input to the tab are automatically overwritten by the specified value.
[AfterCpuStop] tab	Hook after breaking After breaking, the register values input to the tab are automatically overwritten by the specified value.
<Test> button	All the commands described on the tabs are tested.
<Save> button	Saves all the tab contents to a file. If the ID850QB was activated from a project file, the file is saved as "project-file-name.tcl".
<Clear> button	Clears all the descriptions on the tabs.

Remark: Specify the program register and the peripheral I/O registers for the register name.

Memory Mapped I/O window

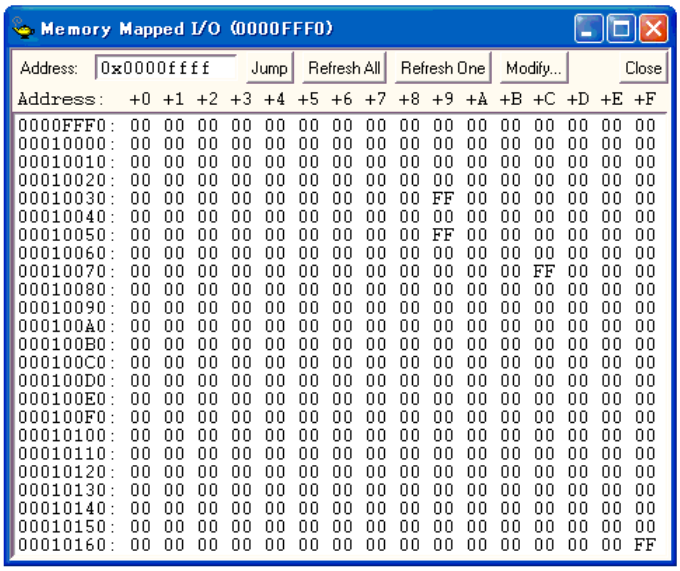
Data is explicitly read or written at a specified address in this window.

When a write is performed in the Memory Window, the data is internally read and verified by the ID850QB. In addition, the memory can also be read simply by scrolling in the Memory Window. On the Memory Mapped I/O window, however, the above operations are not performed.

Therefore, this window is useful for reading or writing a specific address.

While the user program is being executed, it momentarily breaks before data is written in this window.

Figure A-5 Memory Mapped I/O Window



Object	Function
Address:	Input the address to display. The display target address changes by pressing the Enter key or clicking the <Jump> button.The data contents are not read at this time, so the address (numerical value) is displayed in the address display section, but "XX" is displayed in the data section.
<Jump> button	Jumps to the address input in the Address field.
<Refresh All> button	Reads all the areas currently displayed only once. "ZZ" will be displayed in the data section when an attempt is made to read an unmapped area, or when an error occurs upon a read.
<Refresh One> button	Reads data in the memory of the address at which the cursor is placed only once. The read data size depends on the display format. "ZZ" will be displayed in the data section when an attempt is made to read an unmapped area, or when an error occurs upon a read.
<Modify...> button	Opens the Memory Mapped I/O dialog box. The address at which the cursor is placed is the input address displayed in the Memory Mapped I/O dialog box.If this button is clicked after the cursor position is changed in the Memory Mapped I/O dialog box, the Address field in the Memory Mapped I/O dialog box is also changed.

Object	Function
<Close> button	Closes this window.
Context menu	Select the display format from Byte, HalfWord, and Word.

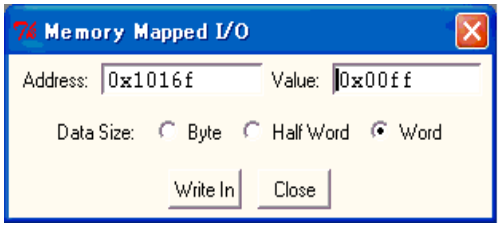
Memory Mapped I/O dialog box

This dialog box can be opened by clicking the <Modify... > button on the Memory Mapped I/O window. It is used to write data to any address.

Remark1: When the area to which data is written is displayed in the Memory Window or Watch Window, data is read in these windows after the <Write in> button is clicked.

Remark2: If Data Size is less than Access Size specified in the Configuration Dialog Box, ID850QB reads data in Access Size once, changes the corresponding part of the read data, and writes the changed data in Access Size.

Figure A-6 Memory Mapped I/O Dialog Box

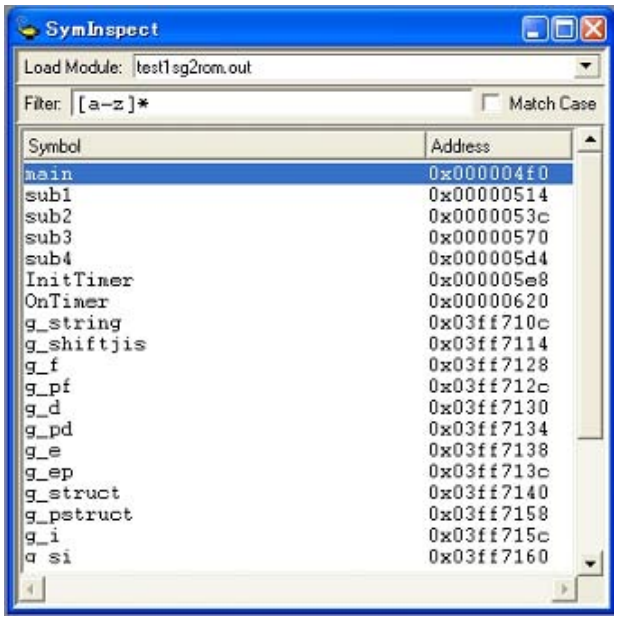


Object	Function
Address:	Input the address to be written. The address corresponding to the data for which the cursor is placed in the Memory Mapped I/O window is displayed by default.
Value:	Input the value to be written.
Data Size:	Select the size of the data to be written. The size specified in the Memory Mapped I/O window is selected by default.
<Write In> button	Data is written to the specified address with the specified size.
<Close> button	Closes this dialog box.

Sym Inspect window

This window displays the list of the symbols and addresses of loaded module files, and is used for searching the list for the properly described symbol.

Figure A-7 Sym Inspect Window



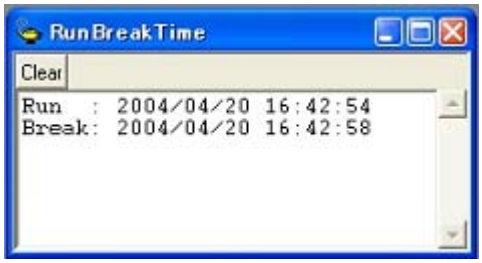
Object	Function
Load Module:	Selects a load module file.
Filter:	Specifies a properly described symbol so that the symbol is retrieved.
Match Case	In Filter:, specify to differentiate or not differentiate case sensitivity. Select this box to differentiate case sensitivity.
Symbol	Displays the symbols. Clicking this icon has the symbols sorted in alphabetical order.
Address	Displays the addresses. Clicking this icon has the addresses sorted in ascending numerical order.

Context Menu	Function
Copy	Copies the selected address to the clipboard.
Jump to Source	Jumps from the address in the selected line to the identical address displayed in the Source Window.
Jump to Assemble	Jumps from the address in the selected line to the identical address displayed in the Assemble Window.
Jump to Memory	Jumps from the address in the selected line to the identical address displayed in the Memory Window.

Run Break Time window

This window displays two types of time: Time at which the user program starts running (Run) and time at which the user program breaks (Break). The window is helpful when measuring takes a long time. The Windows timer function is utilized for this window; the time is displayed in hours, minutes, and seconds.

Figure A-8 RunBreakTime Window



Object	Function
<Clear> button	Clears the time display

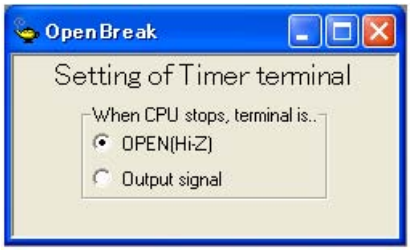
OpenBreak window

The open break function is used to set the pins, which control a motor, to Hi-Z so as to stop the motor safely if the motor control signal is not fed back due to CPU stoppage and it may have an adverse effect on the motor.

For whether the open break function is supported by the emulator used, refer to the user's manual of the target emulator. When MINICUBE or N-Wire CARD is used, the support status depends on the target device, so refer to the user's manual of the target device.

At present, MINICUBE2 does not support this function.

Figure A-9 OpenBreak Window



Object	Function
When CPU stops, terminal is...	Select operation of the open break target pin after the CPU is stopped.
OPEN [Hi-Z]	The open break target pin becomes the Hi-Z state after the CPU is stopped.
Output signal	The open break target pin outputs the signal even after the CPU is stopped.

APPENDIX B ADDITIONAL CAUTIONS

This chapter explains cautions on connecting each emulator and functional differences between when a Midas Lab emulator is connected and IECUBE is connected.

- Cautions on using On-Chip Debug Emulator [MINICUBE] [MINICUBE2]
- Cautions on using Midas Lab emulator RTE-2000H-TP

B.1 Cautions on using On-Chip Debug Emulator [MINICUBE] [MINICUBE2]

Note the following points when connecting on-chip debug emulator MINICUBE, N-Wire CARD, or MINICUBE2.

(1) The contents of the internal RAM may be lost if the CPU reset button is pressed in products supporting a boot-swap function.

(2) The following restrictions are applicable when using the AZ850. The hardware trace method cannot be used. Use the software trace method instead.

(3) Since there is no identification information in single-chip mode 0 or single-chip mode 1 in the TEG chip, the internal ROM start address is fixed to 0h.

(4) The target device that is used for debugging cannot be mounted in the mass production product. (The N-Wire CARD rewrites the flash memory (target device) during debugging, so the guaranteed number of rewrites of the flash memory may not be satisfied.)

B.1.1 When MINICUBE or N-Wire CARD Is Connected [MINICUBE]

Note the following points (1) to (5) when debugging the self programming function using MINICUBE and N-Wire CARD.

(1) A break may not occur even if a hardware breakpoint is set in the interrupt servicing in the user application. The interrupts registered by the handler registration function in the user application can be acknowledged in a flash environment.However, no break occurs in an interrupt servicing acknowledged during flash macro servicing even if a hardware breakpoint has been set in the interrupt servicing. That is, no break occurs in an interrupt service routine acknowledged during self-programming, even if an event breakpoint has been set.

(2) Debug cannot be performed if a break is forcibly generated during flash macro servicing. When a break is forcibly generated during flash macro servicing, the message "Flash Macro Service" is displayed on the status bar. If an attempt is made to continue the debug operation, the error message " F0c25: Flash macro service ROM was accessed or stepped in." will be displayed. In such a case, execute [Go] or [Restart].

(3) If a forcible break is acknowledged in the flash environment, the values in the on-chip flash memory area are undefined and cannot be displayed normally.If a forcible break is acknowledged and generated in the flash environment, the on-chip flash memory area in the Assemble Window is masked[Note] and the all values in the on-chip flash memory area in the Memory Window become 0.

Note: Nothing is displayed in the disassemble display area in the Assemble Window.

(4) Do not set a software breakpoint in the on-chip flash memory area.When a software breakpoint occurs in the on-chip flash memory area ("Software Break" is displayed in the break cause area on the status bar, the error message " F0c25: Flash macro service ROM was accessed or stepped in." will be displayed.

(5) Do not to stop the peripheral macro when using the flash self-programming function in the user application.Select "Non Break" (option to not stop the peripheral macro) in the Peripheral Break area in the Configuration Dialog Box of the ID850QB when using the self-programming function in the user application; otherwise, the on-chip flash memory may be damaged.

B.1.2 When MINICUBE2 Is Connected [MINICUBE2]

Do not perform the following operations when debugging the self-programming function by using MINICUBE2; the debugger may hang up.

(1) Break in flash environment

(2) Stepping in of program that transfers to flash environment

B.2 Cautions on using Midas Lab emulator RTE-2000H-TP

The following table lists functional differences between the V850-IECUBE and RTE-2000HTP + PG2-IE, regarding cautions for connecting Midas Lab emulator RTE-2000H-TP.

Table B-1 Functional Differences Between V850-IECUBE and RTE-2000H-TP + PG2-IE

		IECUBE	RTE-2000H-TP+PG2-IE
Connection			
Connection with host machine		USB	USB or LAN
Startup			
Startup option		None	/ICE:RTE /EXEC:EX850G32RTE
Settings			
Configuration Dialog Box	Chip	O (Available)	O
	Internal Memory	O	X (Not available)
	Clock	O	X
	ID Code	X	X
	Programmable I/O Area	O	O
	Peripheral Break	O	X
	Monitor Clock	O	X
	Target	O	X
	Fail-safe Break	O	X
	Mask	O	X
	Memory Mapping	O	O
	Memory Attribute	Emulation ROM Emulation RAM Target Target ROM I/O Protect	Target I/O Protect

		IECUBE	RTE-2000H-TP+PG2-IE
Extended Option Dialog Box	Trace	O	O
	Timetag Count Rate	O	X
	Memory Size	O	O
	Clear trace memory before run	O	X Cleared before execution
	Trace Data	O	O
	Mode	O	O
	Complement Data	O	O
	Add DMA Point	O	X
	Timer	O	X
	RAM Monitor	O	X
	On Mouse Click	O	O
	Break Sound	O	O
	Verify Check	O	O
	Clear register when reset	O	X Cleared during reset
	Check monitor overwriting when downloading	X	X
RRM Setting Dialog Box		X	X
Flash Option Dialog Box		O	X
Data Flash Option Dialog Box (Fx3)		O	X
Timer Dialog Box		O	X
Function			
RRM		O	X
Trace		O	O
Code coverage (option)		O	X
Access monitor		O	X
Pseudo RM/ DMM		O	X
Emulation memory (option)		O	X
Hardware break		O	O
Software break		O	O
Event		O	O
Event link		O	O
Timer event		O	X
Trace event		O	O
Run-Break timer		O	O

	IECUBE	RTE-2000H-TP+PG2-IE
External Flash download	O	O
High-speed download	O	X
Display of IE version	O	X
Measurement of trace (time tag) resolution and maximum time Displays the total	20 ns/1.4 min. 97.6 hr. (4K division) Clears the time tag to 0 when execution starts	100ns Time tag of the oldest frame is cleared to 0 (Not the accumulated time from execution start)
Run-Break timer Measurement of resolution and maximum time	20ns/2.8 min. 195.2 hr. (4K division)	20ns/6.1h

APPENDIX C INPUT CONVENTIONS

C.1 Usable Character Set

Table C-1 List of Character Set

Classification	Character
Alphabetic characters	Uppercase: A B C D E F G H I J K L M N O P Q R S T U V W X Y Z Lowercase: a b c d e f g h i j k l m n o p q r s t u v w x y z
Numerals	0123456789
Character equivalent to alphabetic character	@ _

Table C-2 List of Special Characters

Character	Name	Usage
(	Left parenthesis	Changes operation order.
)	Right parenthesis	Changes operation order.
+	Plus	Addition operator or positive sign
-	Minus	Subtraction operator or negative sign
*	Asterisk	Multiplication operator or indirect reference operator
/	Slash	Division operator
%	Percent	Remainder operator
~	Tilde	Complement operator
|	Vertical line	Bit sum operator
^	Circumflex	Bit difference operator
&	Ampersand	Bit product operator or address operator
.	Period	Direct member operator or bit position specifier
,	Comma	Delimiter between operands

Character	Name	Usage
[	Left bracket	Array subscript operator or base register specification symbol
]	Right bracket	

C.2 Symbols

(1) A symbol is composed of either of the following characters.

A to Z, a to z, @, _ (underbar), ?, and 0 to 9

(2) A symbol must start with a character other than numerals 0 to 9.

(3) Uppercase characters (A to Z) and lowercase characters (a to z) are distinguished.

(4) A symbol must be no more than 2048 characters long (if a symbol of more than 2048 characters is defined, only the first 2048 characters are valid).

(5) A symbol is defined by loading a load module file.

(6) Symbols are classified into the following types by the valid range:

Global symbol (assembly language, C language)

Static symbol (C language)
- In-file static symbol
- In-function static symbol

Local symbol (C language)
- In-file local symbol
- In-function local symbol
- In-block local symbo

(7) The following symbols are available for each language used:

Assembly language, structured assembly language
label name, bit symbol name

C language
Variable name (including pointer variable name, enumeration type variable name, array name, structure name, and union name)
Function name, label name
Array element, structure element, union element, bit field (if the symbol is an array, structure, or union)

(8) A symbol can be described instead of an address or numeric value.

(9) The valid range of a symbol is determined based on the source debug information when the source file is assembled or compiled.

(10) Describe only the symbol name of a global symbol.

(11) A local symbol is expressed in pairs with a file name.

C.3 Numeric Values

The following four types of numeric values can be used. The input format of each type is as shown below.

The suffix (bold) and the alphabetic characters of hexadecimal numbers may be uppercase or lowercase characters. If the first character is A to F, 0 must be prefixed to it.

In the input field of ID850QB, decimal numbers or hexadecimal numbers are alternately selected, depending on the default radix.

Table C-3 Input Format of Numeric Values

Numeric Value	Input Format
Binary number	n**Y** n...n**Y** (n=0,1)
Octal number	n**O** n...n**O** (n=0,1,2,3,4,5,6,7) n**Q** n...n**Q** (n=0,1,2,3,4,5,6,7)
Decimal number	n n...n n**T** n...n**T** (n=0,1,2,3,4,5,6,7,8,9)
Hexadecimal numbers	n n...n n**H** n...n**H** **0x**n **0x**n...n (n=0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F)

C.4 Expressions and Operators

(1) Expressions

An expression consists of constants, register names, peripheral I/O registers name and symbols coupled by operators.

If peripheral I/O registers name, label name, function name, or variable name is described as a symbol, an address is calculated as the value of the symbol.

The elements making up an expression, except operators, are called terms (constants and labels). Terms are called the first term, the second term, and so on, starting from the left.

(2) Operators

The following operators of the C language can be used:

Table C-4 List of Operators

Symbol	Meaning	Explanation
Arithmetic operator		
+	Addition	Returns the sum of the first and second terms.
-	Subtraction	Returns the difference between the first and second terms.
*	Multiplication	Returns the product of the first and second terms.
/	Division	Divides the value of the first term by the value of the second term, and returns the integer of the results.
MOD %	Remainder	Divides the value of the first term by the value of the second term, and returns the remainder of the results.
- sign	Unary operator (negative)	Returns 2's complement of the value of the term.
+ sign	Unary operator (positive)	Returns the value of the term.
Logical operator		
NOT ~	Negation	Logically negates each bit of the term, and returns the results.
AND &	Logical product	Obtains the logical product of the values of the first and second terms on each bit, and returns the results.
OR |	Logical sum	Obtains the logical sum of the values of the first and second terms on each bit, and returns the results.
XOR ^	Exclusive logical sum	Obtains the exclusive logical sum of the values of the first and second terms on each bit, and returns the results.
Shift operator		
SHR >>	Right shift	Shifts the value of the first term by the value (number of bits) of the second term to the right, and returns the results. As many 0s as the number of shifted bits are inserted in the higher bits.

Symbol	Meaning	Explanation
SHL <<	Left shift	Shifts the value of the first term by the value (number of bits) of the second term to the left, and returns the results. As many 0s as the number of shifted bits are inserted in the lower bits.
Byte separation operator		
HIGH	Higher byte	Of the lowest 16 bits of the term, returns the higher 8 bits.
LOW	Lower byte	Of the lowest 16 bits of the term, returns the lower 8 bits.
Word separation operator		
HIGHW	Higher word	Of the 32 bits of the term, returns the higher 16 bits.
LOWW	Lower word	Of the 32 bits of the term, returns the lower 16 bits.
Other		
(	Left parenthesis	Performs the operation in ( ) before the operation outside ( ). '(' and ')' are always used in pairs.
)	Right parenthesis	

(3) Rules of operation

Operations are performed according to the priority of the operators.

Table C-5 Operator Priority

Priority	Operators
1 Higher	(,)
2	+ sign, - sign, NOT, ~, HIGHT, LOW, HIGHW, LOWW
3	*, /, MOD, %, SHR, >>, SHL, <<
4	+, -
5	AND, &
6 Lower	OR, |, XOR, ^

- If the priorities of the operators are the same, the operation is performed from the left toward the right.
- Performs the operation in ( ) before the operation outside ( ).
- Each term in an operation is treated as unsigned 32-bit data.
- All operation results are treated as unsigned 32-bit data.
- If an overflow occurs during operation, the lower 32 bits are valid, and the overflow is not detected.

(4) Terms

To describe a constant for a term, the following numeric values can be described.

Table C-6 Range of Radixes

Radix	Range
Binary number	0**Y** <= value <= 11111111111111111111111111111111**Y** (32 digits)
Octal number	0**O** <= value <= 37777777777**O**
Decimal number	-2147483648 <= value <= 4294967295 (A negative decimal number is internally converted into a 2's complement.)
Hexadecimal numbers	0**H** <= value <= 0FFFFFFF**H**

C.5 File Names

The following regulations apply to the source file names and load module file names.

(1) Source file names and load module file names

File names are composed of a to z, A to Z, 0 to 9, ., _, +, and -.

File names must start with a character other than ".".

File names cannot be prefixed or suffixed by a period (.) or space.

File names are not case-sensitive.

A file name consists of up to 259 characters including the path.

(2) Other file names

Other file names comply with Windows file name regulations.

The following characters cannot be used in file names.

\ / : * ? " < > | ;

File names cannot be prefixed or suffixed by a period (.) or space.

File names are not case-sensitive.

A file name consists of up to 259 characters including the path.

APPENDIX D KEY FUNCTION LIST

Table D-1 Key Function List

Key	Function
BackSpace	Deletes one character before the cursor and moves the cursor to the position of the deleted character. At this time, the character string following the cursor moves forward.
Delete	- Deletes one character after the cursor and move the character string following the cursor forward. - Deletes a various event condition selected in the Event Manager or each event dialog box. - Deletes the data selected in the Watch Window.
Insert	Alternately selects the insert mode and overwrite mode in the Source Window and Assemble Window. However, this key is invalid in the Memory, Register, and IOR Windows, and only the overwrite mode can be used as an input mode.
PrintScreen	Loads the entire display screen to the clipboard as a bitmap image (function of Windows).
Esc	- Closes the pull-down menu. - Closes the modal dialog box. - Restores the input data.
Alt	Moves the cursor to the menu bar.
End	Moves the cursor to the end of the line.
Home	Moves the cursor to the beginning of the line.
PageUp	Scrolls the screen one screen up. The cursor also moves up to the top of the screen.
PageDown	Scrolls the screen one screen down. The cursor also moves up to the top of the screen.
Space	Inserts one blank character.
Tab	Moves the cursor to the next item.
Up arrow key	Moves the cursor up. If the cursor is at the bottom of the screen, scrolls the screen up one line at a time.
Down arrow key	Moves the cursor down. If the cursor is at the top of the screen, scrolls the screen down one line at a time.
Right arrow key	Moves the cursor to the left. If the cursor is at the left most position on the screen, scrolls the screen one column to the right.
Left arrow key	Moves the cursor to the right. If the cursor is at the right most position on the screen, scrolls the screen one column to the left.
Enter	- Sets the input data. - Presses the default push button.
F1	Opens the Help window.

Key	Function
F2	Forcibly stops program execution. Same function as [Run] menu -> [Stop].
F3	Resets the CPU. Same function as [Run] menu -> [CPU Reset].
F4	Resets the CPU and executes the program. Same function as [Run] menu -> [Restart].
F5	Executes the program. Same function as [Run] menu -> [Go].
F6	Executes the program to the cursor position in the Source or Assemble Window. Same function as [Run] menu -> [Come Here].
F7	The user program is real-time executed until execution returns. Same function as [Run] menu -> [Return Out].
F8	Step execution. Same function as [Run] menu -> [Step In].
F9	Sets a breakpoint at cursor position in Source or Assemble Window. Same function as [Run] menu -> [Break Point].
F10	Next step execution. Same function as [Run] menu -> [Next Over].
F11	Sets or deletes a software breakpoint. Same function as [Run] menu -> [Software Break Point].
Shift+End	Expands the selection range to the end of the line.
Shift+Home	Expands the selection range to the beginning of the line.
Shift+Left arrow key	Expands the selection range one character to the left.
Shift+Right arrow key	Expands the selection range one character to the right.
Shift+F6	Executes the program from the cursor position in the Source or Assemble Window. Same function as [Run] menu -> [Start From Here].
Shift+F9	Resets the CPU. Same function as [Run] menu -> [CPU Reset].
Ctrl+End	Displays the last line. The cursor will also move to the last line.
Ctrl+Home	Displays the first line. The cursor will also move to the first line.
Ctrl+Left arrow key	Moves the cursor one word to the left. If the cursor at the left most position on the screen, scrolls the screen one column to the right.
Ctrl+Right arrow key	Moves the cursor one word to the right. If the cursor at the right most position on the screen, scrolls the screen one column to the left.
Ctrl+F5	Ignores break points being set, and executes the program. Same function as [Run] menu -> [Ignore break points and Go].
Ctrl+F9	Sets the address at the cursor position in the Source Window or Assemble Window to the PC. Same function as [Run] menu -> [Change PC].
Ctrl+A	Selects all the events registered to the Event Manager. Same function as [View] menu -> [Select All Event] in the Event Manager.
Ctrl+C	Copies a selected character string and saves it to the clipboard buffer.

Key	Function
Ctrl+D	Disassembles and displays the results from the jump destination address specified by the data value selected in the current window.Opens the Assemble Window. Same function as [Jump] menu -> [Assemble].
Ctrl+E	Opens the source file displayed in the active Source Window with the editor specified by the PM+ when the PM+ is running. Same function as [Edit] menu -> [Edit Source].
Ctrl+G	Performs a search.Opens the search dialog box corresponding to the current window. Same function as [View] menu -> [Search...].
Ctrl+J	Moves the display position. Opens the each dialog box, depending on the current window. Same function as [View] menu -> [Move...].
Ctrl+M	Displays the memory contents from the jump destination address specified by the data value selected in the current window. Opens the Memory Window. Same function as [Jump] menu -> [Memory...].
Ctrl+O	Loads a view file, source file, or text file. Opens the View File Load Dialog Box. The operation will differ depending on the extension of the file. view file: Displays the file in the corresponding window. Others: Displays the file in the Source Window. Same function as [File] menu -> [Open...].
Ctrl+S	Saves the data displayed in the current window to the view file. Same function as [View] menu -> [Save...].
Ctrl+U	Displays the corresponding source text and source line, using the data value selected in the current window as the jump destination address. Opens the Source Window. Same function as [Jump] menu -> [Source Text].
Ctrl+V	Pastes the contents of the clipboard buffer to the text cursor position.
Ctrl+W	Temporarily displays the contents of the specified data. Opens the Quick Watch Dialog Box. Same function as [View] menu -> [Quick Watch...].
Ctrl+X	Cuts a selected character string and saves it to the clipboard buffer. Same function as [Edit] menu -> [Cut].
Ctrl+Shift+Left arrow key	Expands the selection range one word to the left.
Ctrl+Shift+Right arrow key	Expands the selection range one word to the right.

APPENDIX E MESSAGES

- Display Format
- Types of Messages
- Message Lists

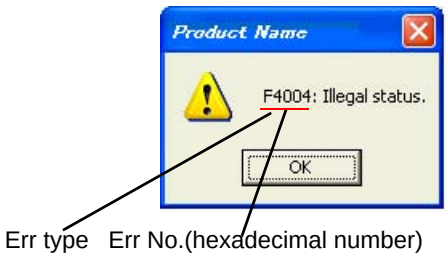
E.1 Display Format

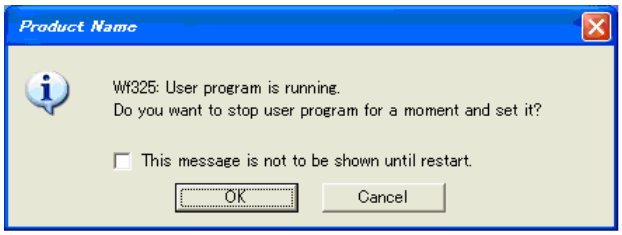
Messages are output to the error/warning dialog box.

By pressing the F1 key while the error/warning dialog box is open, the related online help files are displayed.

If the [This message is not to be shown until restart] checkbox is selected in dialog boxes that appears with this checkbox, the message will no longer displayed while the ID850QB is running. When the ID850QB is started next time, this message can be displayed (default: cleared).

Figure E-1 Error/Warning Dialog Box





E.2 Types of Messages

The ID850QB outputs the following types of messages.

Table E-1 Types of Messages

Types	Meaning
A	Abort Error Stops processing, and terminates the debugger. If this error occurs, debugging cannot be continued.
F	Fail Stops processing, and opened windows and dialog boxes are closed.
W	Warning Stops processing, but opened windows and dialog boxes are not closed.

E.3 Message Lists

< From X0000 > < From X1000 > < From X2000 > < From X3000 > < From X4000 > < From X5000 > < From X6000 > < From X7000 > < From X8000 > < From X9000 > < From Xa000 > < From Xb000 > < From Xc000 > <From Xd000 > < From Xe000 > < From Xf000 >

(1) From *X*0000

F0002:	This feature is not supported.
F0100:	Can not communicate with ICE. Please confirm the installation of the device driver for the PC interface board. 1) Check the connection of the emulator power supply and cables. 2) The driver may not be correctly installed. Reinstall the driver.
A0101:	Can not find initialization file (expc.ini).
A0102:	Host name not found.
F0103:	Data transfer to ICE is timed out. Please confirm the power of ICE, connection of the interface cable, or I/O address of the PC interface board.
F0104:	Data receive from ICE is timed out. Please confirm the power of ICE, connection of the interface cable, or I/O address of the PC interface board.
A0105:	Failed in reading device file (*file name*). 1) Necessary files may be damaged. Reinstall the device file.
A0106:	Illegal data received. 1) Check the power of the emulator, cable connections, and setting of the interface board and restart the debugger.
A0107:	Can not communicate with ICE.
A0108:	Failed in reading initialization file (expc.ini).

A0109:	Can not communicate with ICE. Please terminate the debugger and check the power of ICE or the connection of cable then restart the debugger. 1) An error may have occurred during USB communication (such as disconnection of power or cable) or IECUBE is faulty. **[IECUBE]**
A010a:	Cannot run debugger and a utility at the same time. 1) The QB-Programmer, MINICUBE2 self-testing tool, or OCD Checker is running, so terminate it first. 2) MINICUBE2 is being used by ID78K0-QB, ID78K0S-QB, or ID78K0R-QB, so terminate it first. 3) MINICUBE2 is being used by MULTI or C-SPY, so terminate it first.
A01a0:	No response from the evachip. Please confirm the signal of the CLOCK or RESET WAIT, HLDRQ and so on. No response from the CPU. Please confirm the signal of the CLOCK or RESET WAIT, HLDRQ and so on. 1) Check the HOLD signal, WAIT signal, clock signal, etc. The IOR value (or SFR value) may not be correct.
A01a1:	Failed in reading ie703000.ie.
A01a2:	Break board is not connected.
A01a3:	Emulation board is not connected.
A01a4:	Board configuration of ICE is not consistent.
A01a5:	POD/EM1 board is not connected.
A01a6:	Executor is running. 1) MINICUBE2 is being used by MULTI or C-SPY, so terminate it first.
A01a8:	Failed to find configuration file (lv8hw.ini).
A01ad:	Please update the device driver for the PC interface board. 1) The device driver may be old. Install the latest device driver.
A01ae:	Failed in reading configuration file (lv8hw.ini).
A01af:	Failed in executing monitor command.
A01b0:	Can not communicate with monitor program. Please check the availability of communication port, the setting of CPU board or the type of cable.
A01b1:	Can not communicate with monitor program. Please terminate the debugger and check the power of CPU board or the connection of cable then restart the debugger.
A01b2:	The firmware of the emulator is old version. Please update it with utility to the latest firmware. 1) Update firmware using MQB2UTL.
F0200:	Verification error occurred. Failed in writing memory. 1) External memory could not be accessed, as it is not set. Change the register values necessary for accessing the external memory using the IOR Window or Hook Procedure before download.
F02a0:	Bus hold error. 1) CPU is in the bus-hold status. Reset the debugger.
F02a2:	Can not compulsory break.

F02a3: Reset under continuation. 1) This error occurs when the RESET pin of MINICUBE2 does not become high level after reset release. The following cause is assumed. **[MINICUBE2]** - There is a problem in connection with the target system (RESET).
F02d2: Not enough memory for trace-buffer.
F0300: User program is running.
F0301: User program is being breaked.
F0302: User program is being traced.
F0303: Not traced.
F0304: Trace memory is not set.
F0306: No trace block exists.
F0307: No event condition exists.
F0308: No timer measurement is done.
F0309: No trigger frame exists.
F030a: Tracer is being stopped.
F030b: Specified snap-event has not been registered.
F030c: Specified stub-event has not been registered.
F030d: Timer is running.
F030e: Memory copy area is overlapped.
F030f: Trace has been already set.
F0310: Event condition is not set.
F0311: Too many valid timer event conditions.
F0312: Specified timer event is not set.
F0313: Illegal map range. 1) Check the map range in the Configuration Dialog Box. When mapping to external memory has been performed, change the register values necessary for accessing the external memory using the IOR Window or Hook Procedure before download).
F0314: Only trace delay mode can set with delay trigger.
F0315: Delay trigger cannot set without trace delay mode.
F0316: Overflowed the number of mapping.
F03a0: Target is not turned on. 1) Check the target system power supply. Check the cable connecting the emulator and target board. Check that the VDD signal is input to the connector of the target board.
F03a1: Step execution is being done.
F03a2: Timer and Tracer are running.
F03a3: Event link and BRS events are mixed.
F03d0: Back-trace is being executed.

F03d1: Back-trace is being stopped.
F03d2: Back-trace execution point overrun oldest frame.
F03d3: Register status or Memory status cannot be set up other than Phase1 of event link.
F03d4: No back-trace information exists.
F03d5: Last command can not be backstepped.
F0400: Illegal condition. 1) Settings of the used emulator and those of the Configuration Dialog Box may not match. Check the Chip selection.
F0401: Result of timer measurement overflowed.
F0402: Too many event conditions with path count.
F0403: Too many address range conditions.
F0404: Too many simultaneously-usable-event conditions.
F0405: Too many snap-events.
F0406: Too many stub-events.
F0407: Too many initialization data.
F0408: Too large search data (> 16 byte).
F0409: Too large search data (> search range).
F040a: Too many Linking-event conditions.
F04a0: Software break conditions number overflow.
F04a1: Not enough memory for emulation.
F04a2: Too many partition of bus size.
F04a3: Too many execution-event conditions.
F04a4: Too many bus-event conditions.
A0600: Not enough memory for buffer. 1) There is not enough system memory. Close the applications being executed and the open files.
A0601: Not enough resource of operating system.
F0b20: This event number can not be used.
F0b61: Section Trace event conditions overflow.
F0b66: Cannot use the break before execution event and the software break at the same time. 1) This is because a break before execution is used for implementing a software break. **[MINICUBE]**
F0b80: Reset by hardware error.
F0c00: Monitor file read error. 1) Necessary files may be damaged. Reinstall the debugger.
A0c01: During access of register, CPU did time out. 1) Check the clock signal, etc. The register value may not be correct.
A0c02: During access of memory, CPU did time out. 1) Check the HOLD signal, WAIT signal, clock signal, etc. The memory value may not be correct.

A0c03: During access of I/O register, CPU did time out. 1) Check the HOLD signal, WAIT signal, clock signal, etc. The I/O register value may not be correct.
F0c04: External flash memory database file was not found.
F0c1f: Rewriting security ID code directly is prohibited.
F0c20: Guarded area can not be accessed.
F0c21: Memory was unready status.
W0c22: Memory unready status was canceled.
F0c23: Bus hold under continuation. 1) Check the setting of the target board, or mask the HOLD pin.
F0c24: It cannot shift to debug mode. 1) Check the clock signal. This may be caused by a stopped clock or a slow clock. 2) This error occurs when the monitor program does not respond after reset release. The following cause is assumed. **[MINICUBE2]** - There is a problem in connection with the target system (FLMD0)
F0c25: Flash macro service ROM was accessed or stepped in. 1) Please perform [Go] execution or CPU reset.
F0c26: FLMD terminal is in a write-protected state. 1) FLMD is not in the write-enabled status. Check the status of the FLMD0 and FLMD1 pins.
F0c27: Security flag is in a write-protected state. 1) The security flag of the flash memory has disabled writing, block erasure, or chip erasure. Nothing can be written to the flash memory.
F0c28: Internal RAM is not enough, the writing to flash memory is not made. 1) The internal RAM size is less than 4 KB and flash self-programming cannot be executed.
F0c29: The blank check of flash memory failed.
F0c2a: The erasing of flash memory failed.
F0c2b: The writing of flash memory failed.
F0c2c: The internal verification of flash memory failed.
F0c2d: Failed in writing flash memory.
F0c2e: There is no response from flash macro service.
F0c2f : Response from flash macro service is not right.
F0c30: Flash I/O register operation prohibition setup needs to be canceled.
F0c31: STOP mode under continuation. Can not compulsory break. Please release STOP mode or reset the CPU.
F0c32: Please write in flash memory in the single chip mode 0.
F0c33: Disabling the on-chip debug function is prohibited. 1) An attempt was made to write "0" to the MSB of the ID code. Do not write 0 to the MSB; otherwise, on-chip debugging cannot be performed. **[MINICUBE2]**

F0c34: Writing to the on-chip debug reserved area is prohibited. 1) An attempt was made to write an illegal value to the area reserved for on-chip debugging. Do not write to reserved areas. **[MINICUBE2]** 2) The program failed to overwrite to a code that branches to the monitor program onto the reset entry code. Change the reset entry code to the specified code. **[MINICUBE2]**
F0c35: Abnormal Internal ROM size. The size is different from the default of the device.
F0c36: Abnormal Internal ROM size. The size is different from the default of the device.
F0c37: The voltage is too low to operate flash programming.
F0c38: Extended monitor area is not blank.
F0c39: Real-time RAM monitoring failed.
F0c3a: Writing the data flash area is not supported.
F0c3b: Can not write the data flash memory because of it is not in the data flash environment.
F0c3c: External flash memory information is not set.
F0c3d: Can not erase external flash memory.
F0c3e: Can not write external flash memory.
F0c40: Status of effective event conditions cannot be changed.
F0c41: Coverage test is being executed.
F0c42: Monitor has failed in shift in the debugging mode.Please reset the CPU.
F0c43: Connection of emulator cannot be performed. 1) The switch setting may be wrong if a desktop computer is used and two or more PC cards are inserted. Check the setting. Or it may have malfunctioned. **[MINICUBE]** 2) Check the power to the emulator and cable connections. The switch setting may be wrong if a desktop computer is used and two or more PC cards are inserted. Check the setting. Or it may have malfunctioned. **[IECUBE]** 3) Check the power to the emulator and cable connections. **[MINICUBE2]**
F0c44: Coverage test is being executed.
F0c45: Inside of Power off reset emulation cannot carry out program execution.
F0c46: Change of Internal ROM size or Internal RAM size or RAM monitor or DMM is not valid during Flash Self Emulation.
F0c47: Emulation of ROM correction has already been enabled.
F0c60: Event before execution cannot be set up other than break conditions. 1) Use an event-after-execution.
F0c61: Can not register event numbers which can not be used for hardware break.
F0c62: Event numbers reserved for hardware breaks can not be used.
F0c63: Event link conditions cannot set.
F0c64: Too many ROM-emulation-RAM areas.
F0c67: Writing of flash memory during block is not made.

F0c68: Cannot emulate of ROM correction in undefined code.
F0c69: The address outside the data flash area was specified.
F0c6a: The address outside the external flash memory area was specified.
F0c70: DCU cannot be accessed. 1) The device file selection may be incorrect. Select a device file that supports the target chip in Chip Selection in the Configuration Dialog Box. Check the power to the chip. Check the connection of the signal lines (DCK, DMS, DDI, DDO, and DRSTZ). Check the noise level by a DCK waveform test on the N-Wire Checker. **[MINICUBE]** 2) IE may be malfunctioning. **[IECUBE]**
F0c71: Reset cannot be performed. 1) Check the clock signal. This may be caused by a stopped clock or a slow clock. 2) This error occurs when the RESET pin of MINICUBE2 does not become low level after reset. The following cause is assumed. **[MINICUBE2]** - There is a problem in connection with the target system (RESET).
F0c72: Monitor memory cannot be accessed. 1) Revise the Main OSC value in the Configuration Dialog Box. Check the setting of main clock in the Configuration Dialog Box , the noise level by a DCK waveform test on the N-Wire Checker. The problem may also be caused by an internal chip problem. **[MINICUBE]** 2) Revise the Main OSC value in the Configuration Dialog Box. If this does not solve the problem, IE may be malfunctioning . **[IECUBE]** 3) This error occurs when writing to the monitor program fails. The following causes are assumed. - There is a problem in connection with the target system (communication pins or FLMD0 pin) - Selecting UART or CSI is wrong in the Configuration Dialog Box. - The oscillation frequency that has been input in the Clock area in the Configuration Dialog Box differs from that of the device on the target system. **[MINICUBE2]**
F0c73: Monitor execution cannot be performed. 1) Check the noise level by a DCK waveform test on the N-Wire Checker. The problem may also be caused by an internal chip problem. **[MINICUBE]** 2) IE may be malfunctioning. **[IECUBE]** 3) This error occurs when the ID code was changed during user program execution.Do not change the ID code in the user program. **[MINICUBE2]**

F0c74:	CPU register cannot be accessed. 1) Check the noise level by a DCK waveform test on the N-Wire Checker. The problem may also be caused by an internal chip problem. **[MINICUBE]** 2) The device file selection may be incorrect. Select a device file that supports the target chip in Chip Selection in the Configuration Dialog Box. If this does not solve the problem, the IE may be malfunctioning. **[IECUBE]** 3) An attempt was made to start the debugger with a monitor file that is not supported by the device on the target system. Check if a device is selected correctly in the debugger. **[MINICUBE2]**
F0c75:	Monitor has failed in shift in the debugging mode. Please reset the CPU.
F0c76:	Initial state at the time of DCU access start is unusual. 1) Initial state at the time of DCU access start is unusual (does not start and remains in the reset state). Check the connection of the signal lines (DCK, DMS, DDI, DDO, and DRSTZ). Check the noise level by a DCK waveform test on the N-Wire Checker. **[MINICUBE]** 2) The device file selection may be incorrect. Select a device file that supports the target chip in Chip Selection in the Configuration Dialog Box. If this does not solve the problem, the IE may be malfunctioning . **[IECUBE]**
F0c77:	DCU access is unusuall. 1) DCU access is unusuall (verify error). Check the connection of the signal lines (DCK, DMS, DDI, DDO, and DRSTZ). Check the noise level by a DCK waveform test on the N-Wire Checker. **[MINICUBE]** 2) IE may be malfunctioning. **[IECUBE]**
F0c78:	Failed in reading of trace data.
F0ca0:	Can not communicate with ICE. Please confirm the power of ICE, connection of the interface cable, or I/O address of the PC interface board.
F0ca1:	Monitor file not found. 1) Necessary files may be damaged. Reinstall the debugger. 2) This error occurs when an unsupported device is selected. Check if the selected device is supported.
F0ca2:	This device file does not include the on-chip debug information. 1) An attempt was made to start with a device file not supporting on-chip debugging. The device file may be old. Install the latest device file. **[MINICUBE] [MINICUBE2]** 2) IE may be malfunctioning. **[IECUBE]**
F0ca3:	Unsupported information is included in the on-chip debug information in the device file. 1) An unknown flag is included in the on-chip debug information of the device file.The exec module may be old. Install the latest exec module.
F0ca4:	This device file does not include the IECUBE information. 1) An attempt was made to start with a device file not supporting IECUBE. The device file may be old. Install the latest device file.
F0caf:	Trace block can not be stepped over.

(2) From *X*1000

A1000: Failed in initializing ICE.
A1001: No entry exists for specified number.
A1002: Can not relocate internal RAM.
F1003: Illegal relocation address.
F1004: Illegal condition.
A1005: Invalid attribute.
F1006: Illegal address.
A1007: Not enough memory on ICE.
A1008: Not enough memory for tables. 1) There is not enough system memory. Close the applications being executed and the open files.
A1009: Already initialized.
A100a: Not initialized.
F100b: User program is running.
F100c: Different bus size has been already specified.
F100d: Too large bus size.
F100e: Too large bus partition size.
W100f: Target is not turned on.
F1010: Illegal map range.
F1011: Failed in setting internal ROM and RAM.
F1012: This feature is not supported.
F1013: No terminal name.
W1014: Data is not exist.
A1015: Programmable-IOR does not exist.
F1016: Programmable-IOR does not movable. 1) Necessary files may be damaged. Reinstall the latest device file.
F1017: I/O Protect mapping is possible a target attribute only.
F1018: Illegal Internal ROM size.
F1019: Illegal internal ROM size or internal RAM size.
F101d: Data flash area does not movable.
F101e: Data flash area does not exist.
A10ff: Can not communicate with ICE.
A1dbe: Error occurred inside debugger.

(3) From *X*2000

F2000: Illegal IOR name.

A2001: Illegal address.
F2002: User program is running.
F2003: Illegal IOR number.
F2004: Illegal bit number.
W2005: IOR of Read Protect attribute was specified.
F2006: Hidden IOR was specified.
F2007: IOR of ban read or write was specified.
F2008: IOR not existing was specified.
A2009: Device file is damaged or error is in file.
F200a: Illegal value specified for IOR.
A200b: Can not copy.
A200c: Not enough memory. 1) There is not enough system memory. Close the applications being executed and the open files.
W200d: No initialize data for IOR.
F200e: IOR area can not be accessed.
A20ff: Can not communicate with ICE.
A2222: Illegal condition.

(4) From *X*3000

F3000: No mapped address was accessed. 1) The allocation addresses of the program and the addresses of the debugger may not match. Set the mapping to the external memory in the Configuration Dialog Box according to the allocation addresses specified in the link directive file on compilation. When mapping to external memory has been executed, change the register values necessary for accessing the external memory using the IOR Window or Hook Procedure before download.
F3001: Memory has different value.
F3002: Illegal start address.
F3003: Illegal end address
F3004: Illegal start address and end address.
F3005: Illegal condition.
F3006: User program is running.
F3007: Verification error.
F3008: No condition specified.
F3009: Parameter size does not align with access size alignment.
F300a: Specified address does not align with access size alignment.
F300b: Source address does not align with access size alignment.
F300c: Destination address does not align with access size alignment.

F300d: Illegal end address.
F300e: Different access size in specified area.
F300f: Different access size both in source and destination areas.
F3010: Different access size in destination area.
F3011: Different access size, source & destination.
A3012: Not enough memory. 1) There is not enough system memory. Close the applications being executed and the open files.
F3013: Failed in writing DMM.
F3014: Oveflowed mapping area.
F3015: Processing was interrupted.
F3016: This feature is not supported.
A30ff: Can not communicate with ICE.

(5) From *X*4000

F4000: Can not delete specified event. 1) The specified event cannot be deleted as it is being used under another condition. Invalidate it for other usages before deleting.
F4001: Illegal table number.
F4002: Illegal start address.
F4003: Illegal end address.
F4004: Illegal status.
F4005: Illegal data.
F4006: Specified event number has been already used.
F4007: Too many same events are registered.
F4008: Specified event has not been registered.
F4009: Illegal data size.
F400a: Illegal mode.
F400b: Setting value is inaccurate.
F400c: Event link conditions cannot be used for section trace conditions.
F400d: Too many identical events are registered (>= 32767).
F400e: Specified event condition does not exist.
F400f: Illegal event link condition.
F4010: Function not found.
A4011: Not enough memory. 1) There is not enough system memory. Close the applications being executed and the open files.
F4012: Timer is being disabled.

W4013: Access size is different from its mapped bus size.
F4014: Can not use software break.
F4015: Can not use event condition specifying address range.
F4016: Can not change event condition.
F4017: Can not access word at odd address.
A4018: Not enough memory. 1) There is not enough system memory. Close the applications being executed and the open files.
F4019: This feature is not supported.
F401a: No Event.
F401b: Can not use tag-event.
W401c: Software break can not be set on this area.
F401d: Start event and end event of timer are not made to the same setup.
F401e: Too many trace-events.
F401f: Path count cannot be set up.
F4020: Address range cannot be set up in event before execution.
F4021: Event conditions number overflow.
F4022: Software DMM conditions number overflow.
F4023: Real-time call conditions number overflow.
F4024: Software break call conditions number overflow.
F4025: Illegal snap condition.
F4026: Too many event conditions cannot be set as Phase1 and Phase2 of event link conditions.
F4027: Software break conditions number which can be set as internal ROM was overflow.
F4318: Illegal memory bank setting.

(6) From *X*5000

A5000: Illegal device file type.
A5001: Not enough memory. 1) There is not enough system memory. Close the applications being executed and the open files.
A5002: Can not open device file.
A5003: Reading of device file went wrong.
A5004: Can not close device file.
A5005: Illegal device file format. 1) Necessary files may be damaged. Reinstall the device file.
A5006: Failed in initializing ICE.
A5007: Device file has broken or error is in a file.

F5008: Can not open device file. 1) Necessary files may be damaged. Reinstall the device file.
F5009: Can not open ie703000.ie
F500a: Specified device file is illegal version. 1) Necessary files may be damaged. Reinstall the device file.
W500b: Specified device file does not relocate internal RAM.
A500c: Failed in reading expc.ini.
A500d: Not enough memory. 1) There is not enough system memory. Close the applications being executed and the open files.
W500e: No tag data which it was going to refer to device file.
A5300: Illegal device file type.
A5301: Not enough memory. 1) There is not enough system memory. Close the applications being executed and the open files.
A5302: Can not open database file. 1) Necessary files may be damaged. Reinstall the debugger and device file.
A5303: Reading of database file went wrong.
A5304: Can not close database file.
A5305: Illegal database file format. 1) Necessary files may be damaged. Reinstall the debugger, and device file.
A5306: Database information has been already initialized.
A5307: Database information does not exist.
F5308: Can not open specified database file. 1) Necessary files may be damaged. Reinstall the debugger.
F5309: Specified database file is illegal version. 1) Necessary files may be damaged. Reinstall the debugger, and the device file.

(7) From *X*6000

F6000: Current function does not exist.
F6001: Illegal symbol name.
F6002: Illegal condition.
F6003: Illegal function name.
F6004: Overflowed output buffer size.
F6005: Illegal expression.

(8) From *X*7000

F7000: Illegal mode.

F7001: User program is running.
F7002: User program has been stopped.
F7003: Trace enabled.
F7004: Trace memory is not set.
F7005: Function return address does not exist, can not do step execution.
W7010: No source information exists.
W7011: Unknown result of step execution.
A7012: Not enough memory. 1) There is not enough system memory. Close the applications being executed and the open files.
A70fe: Bus hold error. 1) CPU is in the bus-hold status. Reset the debugger.
A70ff: Can not communicate with ICE.
F7801: End waiting state of step execution was canceled.
F7802: End waiting state of step execution was canceled.
F7f00: Aborted step execution.
F7f02: Suspended step execution.
A7f03: Failed in canceling RUN/STEP.
F7f04: Can not execute non-mapped area.
F7f05: This feature is not supported.

(9) From *X*8000

F8000: Specified file was not found.
F8001: Illegal line number.
F8002: Current information is not set.
F8003: Illegal address.
F8004: This feature is not supported.

(10) From *X*9000

A9000: Specified register symbol does not exist.
A9001: Specified register symbol ID does not exist.
F9002: Illegal value.
A9003: Illegal condition.
A9004: Too large register size.
F9005: This feature is not supported.

(11) From *X*a000

Fa001: Illegal expression.
Fa002: Start address is bigger than the end address.
Fa003: Illegal source path.
Fa004: Too long expression.
Aa005: Not enough memory. 1) There is not enough system memory. Close the applications being executed and the open files.
Fa006: Illegal argument.
Fa007: Illegal program number.
Fa008: Source path is not set.
Fa009: File not found.
Fa00a: Can not open file. 1) The file is damaged or does not exist. Recreate the file.
Aa00b: Can not close file.
Aa00c: Failed in reading file. 1) The file is damaged or does not exist. Recreate the file.
Fa00d: Not source file of load module.
Fa00e: Illegal line number.
Fa00f: Variable does not exist.
Aa010: Can not communicate with ICE.
Fa011: Can not access register.
Fa012: Can not access memory.
Aa013: Reading of file went wrong.
Fa014: It was going to open the binary file.
Fa015: Can not get temporary path. 1) The disk is full. Delete or move unnecessary files and increase the available memory in the disk.
Fa016: Can not create temporary file. 1) The disk is full. Delete or move unnecessary files and increase the available memory in the disk.
Fa017: Can not remove temporary file.
Fa020: This feature is not supported.
Fa021: Symbol assigned to register cannot be specified.
Fa022: The character which cannot be used for the folder is contained or the folder does not exist.

(12) From *X*b000

Fb000: Illegal command line.
Fb001: Program information does not exist in specified load module file.

Fb002: File not found.
Fb003: Function not found.
Fb004: Selected load module different from kind (Chip) was loaded.
Fb005: Symbol not found. 1) The address could not be found. Specify a location holding address information.
Fb008: Illegal expression.
Ab009: Not enough memory. 1) There is not enough system memory. Close the applications being executed and the open files.
Fb00a: Illegal symbol in load module file.
Fb00b: Current program does not exist.
Fb00c: Current file does not exist.
Ab00d: Current function does not exist.
Ab00e: Current line does not exist.
Ab00f: Tag not found.
Ab010: Failed in loading symbol table.
Ab011: Illegal line number.
Fb012: Too large line number.
Ab015: Reading of file went wrong. 1) The file is damaged or does not exist. Recreate the file.
Ab016: Can not open file. 1) The file is damaged or does not exist. Recreate the file.
Ab017: Failed in writing file. 1) The file is damaged or does not exist. Recreate the file.
Ab019: Reading of file went wrong.
Ab01a: Can not close file.
Fb01b: Too long load module file name.
Ab01c: Too many entries of the task kind.
Fb01d: Address not found.
Wb01e: No debug information (not compiled in Debug Build mode).
Fb01f: Can not find structure member.
Fb020: Can not find value.
Fb021: There are neither debug information nor symbol information in load module file. 1) To create a load module with appended debug information, execute build in build mode of Debug Build.
Fb022: Illegal line number.
Ab023: Current stack frame is not active.
Ab024: Different section.

Fb026: Too many array dimensions (> 4).
Fb027: Found end of file. 1) The specified file may be damaged. Recreate the file.
Fb028: This feature is not supported.
Fb029: Illegal address.
Ab02a: Can not communicate with ICE.
Fb02b: Can not stack trace with current PC value.
Fb02c: Too many blocks for one function.
Fb02d: Illegal argument.
Fb02e: The file does not exist in the SOURCE PATH. 1) On stopping the program, the source that the debugger tried to display could not be found. Check if the path connects to the source in the Debugger Option Dialog Box, or check if the source is in the same directory as the out file. Refer to the Assemble Window on which the error message is displayed, and check if the corresponding path connects.
Fb02f: Information has been deleted because of optimization.
Ab030: Monitor timed out. 1) Check the power of the emulator, cable connections, and setting of the interface board and restart the debugger.
Ab031: Already set in memory.
Ab032: Out of scope.
Ab033: LP is not stored.
Fb034: Return execution from present PC position cannot be performed.
Wb036: Out of variable region.
Fb037: Too Many Line-Numbers Information.
Fb038: Compiler version mismatch. 1) Recreate the load module with the latest compiler.
Ab039: Failed in loading debug information.
Ab03a: No more section information.
Fb040: Specified file is not load module. 1) This is not a linker output file. Source debug cannot be executed with the load module before output from the linker. Specify the load module output from the linker.
Ab041: Too many files in load module to download.
Wb042: Symbol module is not initialized.
Fb32e: Illegal port number.
Fb32f: Illegal port name.
Fb330: Illegal port position.
Fb331: Illegal increment number.

Fb332: Port for memory bank is not set.
Fb333: Illegal bank number.
Fb334: Area for memory bank is not set.
Wb335: Too long symbol name.

(13) From *X*c000

Fc001: Can not open file. 1) The file is damaged or does not exist. Recreate the file.
Ac002: Can not close file.
Ac003: Reading of file went wrong. 1) The file is damaged or does not exist. Recreate the file.
Ac004: Reading of file went wrong.
Fc005: Illegal file type.
Fc006: Kind (Chip) of load module is illegal.
Fc007: Specified file is not load module. 1) This is not a linker output file. Source debug cannot be executed with the load module before output from the linker. Specify the load module output from the linker.
Fc008: Specified load module file (ELF) is old version.
Ac009: Not enough memory. 1) There is not enough system memory. Close the applications being executed and the open files.
Fc00a: No mapped address was accessed.
Fc00b: Load module is not loaded.
Fc00c: Illegal argument.
Fc00d: User program is running.
Fc00e: User program is being traced.
Fc00f: Interrupted.
Ac010: Can not communicate with ICE.
Fc011: Illegal load module file format.
Fc012: Check sum error.
Fc013: Too wide address range to upload (> 1MB).
Fc014: Failed in writing file. 1) The file is damaged or does not exist. Recreate the file.
Fc015: Illegal program number.
Fc016: Load information is full.
Wc017: Symbol information is duplicated, please reset symbols.

Fc018:Specified file is not load module. 1) This is not a linker output file. Source debug cannot be executed with the load module before output from the linker. Specify the load module output from the linker.
Fc019: Failed in writing memory.
Wc01a: BSS area is assigned to non-mapped area. 1) When the program is executed, a non-map break may occur. Either allocate the BSS area to the internal RAM by using a link directive, or map the emulation memory or target memory to the BSS area using the Configuration Dialog Box of the debugger.
Fc01b: Programmable-IOR address not specified. 1) Necessary files may be damaged. Reinstall the debugger.
Wc01c: Programmable IOR address mismatch. 1) Necessary files may be damaged. Reinstall the debugger.
Wc01d: Selected load module different from kind (Chip) was loaded.
Fc01e: .Flash erase is not supported.
Fc01f: This feature is not supported.
Fc021: The debugger can't download at high speed because the object file has the code out of the internal ROM and the internal RAM.

(14) From *X*d000

Ad000: Error occurred inside debugger.
Ad001: Not enough memory. 1) There is not enough system memory. Close the applications being executed and the open files.
Ad002: Failed in reading initialization file (expc.ini).
Ad003: ICE is not connected.
Fd004: Can not find Dynamic Link Library.

(15) From *X*e000

Fe000: Illegal argument.
Fe001: Illegal start address.
Fe002: Illegal end address.
Fe003: Too large size.
Fe004: Can not open file. 1) The file is damaged or does not exist. Recreate the file.
Fe005: Failed in reading file. 1) The file is damaged or does not exist. Recreate the file.
Fe006: Reading of file went wrong.

Fe007: Failed in writing file. 1) The file is damaged or does not exist. Recreate the file.
Ae008: Not enough memory. 1) There is not enough system memory. Close the applications being executed and the open files.
Fe009: Illegal file format.
Fe00a: Verification error.
Fe010: This feature is not supported.

(16) From *X*f000

Af000: Not enough memory. 1) There is not enough system memory. Close the applications being executed and the open files.
Ff000: Not enough memory.
Ff001: [XXX] not found.
Wf002: Not found [XXX]. Search from the beginning?
Wf003: Already exceed search region.
Ff004: Missing parameter.
Ff005: Illegal function name.
Ff006: Illegal number.
Ff007: Start address is bigger than end address.
Ff008: Illegal symbol or expression.
Ff009: [XXX] This file is illegal type.
Ff100: Disk cannot write or full.
Ff101: File not found.
Ff102: File not Create.
Ff103: Old project file version.
Ff104: Illegal project file format.
Ff105: This file is a project file for [XXX].Please select a correct file.
Wf106: CPU in the Project File was Changed. You must exit the debugger for the new CPU. Do you exit the Debugger?
Wf107: CPU in the Project File was Changed. Do you start the Debugger with this CPU?
Wf108: Selected project file different [YYY] from chip [XXX] was opened. Does it open, although the chip cannot be changed?
Wf109: Project Manager cannot be used with the debugger of this version. Please use PM+.
Wf200: No difference encountered.
Ff201: Memory mapping error.

Ff202:	Verify error. 1) External memory could not be accessed, as it is not set. Change the register values necessary for accessing the external memory using the IOR Window or Hook Procedure before download .
Wf203:	When a program is running, while rewriting a memory, program execution stops for a moment. Do you wish to rewrite a memory?
Wf204:	There is an enabled software break point, Failed in DMM.
Wf300:	Would you like to save the changes made in [XXX]?
Ff301:	The symbol being used on the event condition can't be evaluated.
Wf302:	Delete: [XXX]
Wf303:	[XXX] is edited. Delete: [YYY]?
Wf304:	[XXX] is edited. Save: [YYY]?
Wf305:	[XXX] is already exist. Do you replace it?
Ff306:	This name is too long.
Ff307:	There is the same name in other kinds.
Ff308:	An address can't be omitted.
Ff309:	Illegal address mask.
Ff30a:	Illegal data mask.
Ff30b:	Illegal ext probe mask.
Ff30c:	Illegal ext probe data.
Ff30d:	Illegal pass count.
Ff30e:	Illegal register name.
Ff30f:	Illegal register bank.
Ff310:	Illegal delay count.
Wf311:	Only one [XXX] can be enabled. Do you make this [YYY] to enable?
Ff312:	[XXX] is already there.
Ff313:	Event number already exist.
Ff314:	Event name is not set.
Ff315:	[XXX] is already there.
Ff316:	Max number of enabled [XXX] event is over. Please disable other enabled [YYY] event.
Ff317:	Max number of set event is over.
Ff31e:	Illegal start address.
Ff31f:	Illegal end address.
Ff322:	Illegal count rate.
Ff323:	Illegal time out break count.
Ff324:	Section and Qualify can be specified at the same time.
Wf325:	User program is running. Do you want to stop user program for a moment and set it?
Wf326:	User program is running. Do you want to stop user program for a moment and delete it?

Ff327: RAM monitor was enabled, a software break point cannot be used.
Wf328: The software break conflicted with the hardware break. There is a possibility of executing an illegal instruction by re-execution after the break. 1) Reset the CPU. If a fetch hardware break is set, do not set a software break in its neighborhood. If an access hardware break is set, do not set a software break.
Ff350: There is a phase which event are not in the middle.
Ff351: The same event is contained in Link and Disable.
Ff352: An event isn't specified.
Ff357: AND event is in Phase.
Ff400: Coverage mapping error.
Wf401: Clear coverage?
Ff500: Illegal symbol.
Ff501: Illegal value.
Ff502: Illegal parameter.
Ff503: Max number of symbol is over.
Ff504: This variable cannot be set as a break. 1) Break cannot be set for the following variables. - Local variables, static variables - Array variables, member variables of structures/unions - Register/peripheral I/O registers - Variable expressions
Wf600: Save project file?
Wf601: When connecting the target system, please turn on the target system. 1) When a target system is not connected, simply click the <OK> button.
Wf602: Please change a MODE mask condition or connect the target system.
Ff603: Incorrect ID Code. 1) This may be caused by the following. **[MINICUBE]** - The ID code is incorrect. -> Input the correct ID code. - The internal flash memory is in the write mode because the FLMD0 pin is high. -> Make the FLMD0 pin low. - The emulator connection prohibition mode is set because the ID code (bit 7 of address 0x79) is 0. ->Erase the internal flash memory once.

Af604:	Incorrect ID Code. Abort the debugger. 1) This may be caused by the following. **[MINICUBE]** - The ID code is incorrect. -> Input the correct ID code. - The internal flash memory is in the write mode because the FLMD0 pin is high. -> Make the FLMD0 pin low. - The emulator connection prohibition mode is set because the ID code (bit 7 of address 0x79) is 0. ->Erase the internal flash memory once.
Ff605:	Please check connection with the target board. 1) Check the connection of the target connector (TC). If a target system is not connected, review the Target setting in the Configuration Dialog Box.
Ff606:	Please check connection with the target board, and power on it. 1) Check the target system power supply. If a target system is not connected, review the Target setting in the Configuration Dialog Box.
Wf607:	Please check connection of the exchange adapter. 1) Check the connection of the exchange adapter (EA). Recommend wearing of the exchange adapter, if the target system is not connected.
Ff608:	Please disconnect the target board. 1) A current may flow from the internal power supply to the target system. Disconnect the target system connector (TC) from the conversion adapter (EA). Review the setting in the Configuration Dialog Box if the target system is not connected.
Ff609:	Please power off the target board, and disconnect it.
Af60a:	Incorrect ID Code. Flash memory was erased. Abort the debugger. 1) This message is displayed if ID authentication address 0x84 results in failure when the mode to erase the flash memory contents has been set, and the flash memory contents are erased. **[MINICUBE]**
Af60b:	Disabled ID Code. Flash memory was erased. Abort the debugger. 1) This message is displayed if the target system connection cable is disconnected when using the debugger in power off emulation mode, when the debugger is activated after the target system power is turned off, or when the flash memory contents are erased. **[MINICUBE]**
Af60c:	During break Target was not turned on.
Wf60d:	Because the Source Path had exceeded 8191 characters, it rounded it down.
Wf700:	Do you want to download Load Module File?
Wf701:	Do you load symbol information only?
Wf800:	Configuration of Memory Bank is not set.
Wf801:	BANK address must be in target memory.
Ff802:	All events are deleted. because the use of external probe was changed.
Ff803:	This event address is invalid on current configuration.
Ff804:	Invalid PC value.

Ff805:	Cannot set temporary break on this address.
Ff806:	External data is being used by Debugger.
Ff900:	Illegal I/O port name.
Ff901:	Memory mapping error. 1) The specification of the address is illegal. Check the addresses that can be specified in the Add I/O Port Dialog Box.
Ff902:	Illegal access size.
Ff903:	Illegal access type.
Ff904:	There is the same name.
Wf905:	[XXX] is already exist. Do you replace it?
Wf906:	Would you like to register the change made in [XXX]?
Ffa00:	The [XXX] function of current program on PC position not found. 1) The symbol specified in main() label: in the Debugger Option Dialog Box could be found. Set a symbol of the main routine of the program. Default is _main.
Ffa01:	The line information on PC position not found. 1) The source file corresponding to program counter (PC) value when the program was stopped could not be found. The following reasons are possible. -The source file exists in a location that the source path does not connect to. -The program stopped where the source files, such as library or RX, do not exist. -The program looped, jumped to an address that is not used by the program, and stopped there.
Wfb00:	User program is running. Do you want to stop user program? 1) <Yes> button is selected, execution of the user program is stopped and then the Exit Debugger Dialog Box is displayed. If it is specified in the Debugger Option Dialog Box that the Exit Debugger dialog box is not to be displayed, however, the ID850QB is terminated. <No> button is selected, execution of the user program is not stopped and the Exit Debugger Dialog Box is not displayed. The ID850QB is not terminated.
Wfb01:	Since bit 7 of address 0x79 in the ID code are 0, The N-Wire emulator becomes prohibition of use henceforth. Do you exit the debugger as it is?
Ffc00:	Online help window cannot be started. Please install HTML Help environment with reference to a users manual.
Wfc01:	There is a bank of write mode in the instruction RAM. (IRAMM=0x??) Do you go on to execute?
Ffd00:	Failed to specify [XXX].
Ffe00:	The maximum size of RRM was exceeded.
Wfe01:	There is a duplicate RRM address.
Wfe0b:	It shift to the flash mode. Is it completely cleared but is the present event. Doesn't it care?
Ffe0c:	RAM monitor is enabled. The present software break points are completely disabled. Doesn't it care?
Fffff:	Interrupted.

APPENDIX F INDEX

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V

W

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